Light and Lighting

Vol. XLVIII.—No. 4

April, 1955

Published by The Illuminating Engineering Publishing Co., Ltd., on the 1st of each month, at 32, Victoria Street, London, S.W.1. ABBey 7553. Subscription rate 25s. per annum.

CONTENTS

Lighting Abroad

ALTHOUGH those principles of lighting which are based on visual sensitivities are of universal applicability, the means by which they are put into practice differ in different countries. But it is on the aesthetic plane that national tastes, preferences and imagination find expression most freely in practical lighting, and it is interesting as well as instructive to know something of what is being done in different fields of lighting in countries other than our own. The review of lighting practice abroad which is featured in this issue—although necessarily incomplete—is not confined to the aesthetics of lighting, and it will doubtless be welcomed by our readers. It is a foretaste of the much more detailed review shortly to be presented in Zurich by the numerous member nations of the Commission Internationale de l'Eclairage. The C.I.E. is concerned with every aspect of lighting and the interchange of information for which it provides is of great value, as well as are the discussions which take place at the four-yearly meetings of the Commission. This country is a very active member of the Commission and we believe a large British delegation will be attending the meeting at Zurich in June. In due course we shall give some account of the proceedings.

Notes and News

I.E.S. Council Report

The annual report of the council of a learned society must often—of necessity—be a rather lengthy affair concerned with subjects which are already in the minds of the society's members. Yet those members of the I.E.S. who care to reflect upon the recent report of their Council can do so with some satisfaction. During 1954 the downward trend in membership was reversed, and a year of vigorous action is reported upon.

The report does not give attendance figures for the meetings which are regularly held in so many parts of the country, and it would be interesting to know if television is taking its toll of the I.E.S. as of other evening activities. So far as London is concerned the meetings in 1954 seemed to be remarkably well attended; though an early mass exodus from one meeting reminded those who stayed that it was the evening of " the Spartak match."

The chief news from the provinces comes from the Leeds Centre, which has always been active in the fostering of Groups. The disappointment at the faltering of the Bradford and Huddersfield Groups is tempered by the good news from Hull where an active section of members has just been established. But for fast working the enthusiasts in the Transvaal must hold the record; they have progressed from a Group to a Centre in 12 months.

The most important domestic event of the year was, of course, the Summer Meeting at Southport, and it is interesting to see from the report that the Council reaffirm the general opinion that the meeting was a great success; in fact, the Council appear to suggest that, after some experimentation, the right " pattern " has now been found for the Summer Meeting.

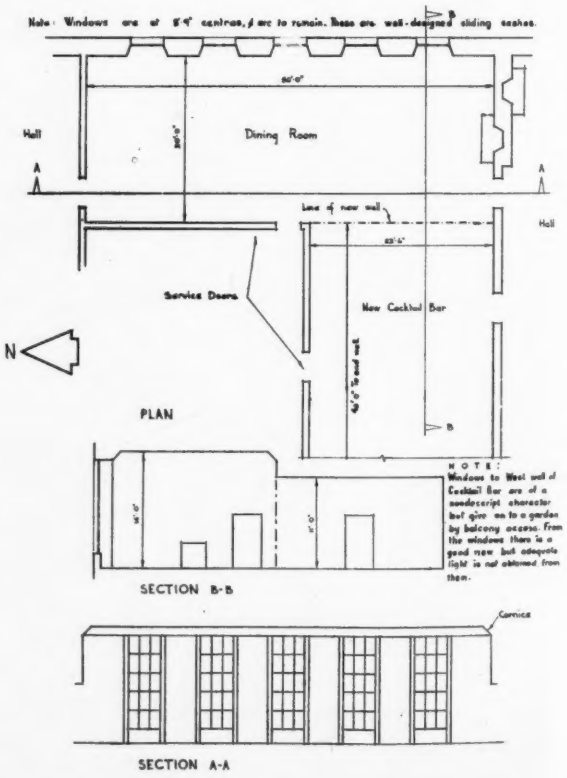
Dow Prize Competition

There was no doubt much disappointment that the second Dow Prize Competition should have been such a failure and that it was decided to cancel the joint I.E.S./R.I.B.A. meeting at which the entries were to have been displayed and the assessors' report presented. The number of entries was only six, compared with 26 for the first competition; the reason for cancelling the meeting, however, was that the entries were, in the opinion of the assessors, Dr. S. English and Mr. A. Douglas Jones, of such a poor standard. The prize was not awarded. It was thought that to display and discuss the entries under such circumstances might prove too discouraging to students, though we agree that there is something to be said for the point of view that students might learn something if their mistakes are pointed out to them.

It is not possible here to discuss individual entries but the following précis of the assessors' report will no doubt be of interest to those who entered the competition and to others. The drawing issued with the full details of the problem is reproduced.

The particular aims of the competition were (a) to encourage architectural students to take a real and intelligent interest in lighting matters, and (b) to encourage co-operation between young architects and young lighting engineers in the planning of lighting installations that shall be aesthetically acceptable and producing desired effects while at the same time complying with the requirements of good illuminating engineering practice.

The essence of the problem put to competitors was : " The layout, lighting, decoration and furnishing of a dining-room and cocktail bar in a city hotel. The dining-room is a fine eighteenth-century room with an original



marble fireplace and with mahogany doors. The floor is made up of deal boards. The dining-room faces on to a pleasant open space. The cocktail bar has no particular architectural qualities. Its ceiling, which is lower than that of the dining-room, houses the ventilating ducting which is part of an existing plenum system. The position of the intakes and outlets are left to the discretion of the competitors. If desired, the space within this false ceiling may be used for recessing lighting fittings."

One would have expected students to look for pointers in the question. Only two competitors, however, reacted to the "fine eighteenth-century room." One of them, though stressing the need to retain the traditional fabric, proposed lighting which did not match the dignity of the room. The other competitor frankly admitted that his modern lighting clashed with the eighteenth-century characteristics of the room, and therefore removed the panelling and the original marble fireplace—a solution that can hardly be expected to commend itself to assessors who had deliberately put the fireplace there.

The absence of architectural quality in the cocktail bar was a clue for the lighting to be made a special feature to transform a featureless space into a gay and exciting room. Nothing particularly interesting was proposed; in fact, several competitors proposed well-diffused or indirect lighting—which would have been dull and uninteresting.

There was frequent evidence of *absence of co-operation* with lighting students; in only one case was there clear evidence that a lighting engineer had contributed to the proposed scheme. This was the only case in which a serious attempt had been made to design general lighting fittings for the dining-room along lines which matched the room itself. In such a room there is no reason why fittings of the candelabra type should not be designed for use with filament lamps, and such fittings when properly designed and proportioned are acceptable and satisfactory in a period room.

Other points which student architects should appreciate are :—

(a) It is not enough to say that table lighting is provided by filament lamps in spun alloy or pleated paper shades.

(b) Strong and relatively dark colour for wall and ceiling decoration *may* look satisfactory in strong daylight, but they effectively kill artificial light unless powerful direct lighting fittings are used, and even then the brightness relationships are unsatisfactory and visually disturbing.

(c) The present-day conical type of reflector fitting if carried to extremes becomes impracticable; lamps have to be accommodated and wired, whilst the general use of such fittings may produce illumination which is excessively spotty and giving rise to sharp changes in brightness that is not good practice even in local lighting.

(d) A forest of local lighting fittings, each suspended by yards of flex, is an eyesore even when newly installed —a few months after installation and with little attention they may even become offensive.

(e) The expression of one's moods or personality in the design of lighting fittings or installations needs to be kept well in hand, otherwise freakishness creeps in.

It is indeed a pity that competitors (and others) are so ready to jettison common sense in favour of tricks in design or presentation; this attitude to architecture, which is very general, is moribund. One scheme was full of architectural tricks, but there can be little doubt that it would prove dull.

Few, if any, of the competitors can be free from criticism on their use of colour. If different coloured walls are to be used in a room, why use colours of similar value and why a dark window wall? One competitor uses a disruptive mural in the bar, an equally objectionable pattern on the bar front, and chairs which have different coloured seats and backs.

In several of the schemes the dining-room table pattern bears no relationship to the windows, walls or fireplace, and some attempts at creating an atmosphere of informality in the bar have produced only haphazard arrangements. One scheme makes use of fixed seats around the bar and creates a bottleneck between the end seats and the bar counter.

Attention must also be given to practical details; projecting heads of bolts on a bar top are liable to cause a lot of trouble. One scheme makes use of a grille between the bar and the dining-room to enable people in the bar to see when their table is ready—but only two tables can easily be seen from the bar. The grille is also fitted with a single sheet of plate glass to maintain the efficiency of the ventilating system—but no door has been fitted between the bar and the dining-room. Furthermore, if the owners are prepared to pay for a large sheet of plate glass to give an unobstructed view, why, then, break it up with a grille? Lastly, a semi-transparent white Terylene curtain is draped behind the glass from floor to ceiling in order not to create too free a view between the two rooms.

One or two of the competitors have got into trouble through using mirrors. If a mirror is used to give apparent length to a room, why use a dark ceiling to lower it?

Carpets have to be utilitarian; some used light-coloured carpets, which mark easily, and others used dark or black carpets, which should have been patterned.

We hope that the above is a fair précis of the assessors' report and that students rather than being discouraged by this criticism of their efforts will find the comments constructive.

It is most unfortunate that this second competition should have failed, particularly as the first was so successful. We feel it would be a mistake to regard this failure as a sign that architects are not interested in lighting—we believe that they are more interested at the present time than they have ever been and that it is up to the lighting industry to meet them more than half-way.

As to the future of the Dow Prize Competition (which incidentally was never intended to be always associated with the architectural profession), we believe this is now under discussion and it is perhaps better not to comment at this stage.

Finally we would congratulate the students who "had a go" when so many who could have tried did not do so.

" Abstract " lighting in the entrance to a cinema, Hannover.

International Random Review

Encouraged by interest in the annual random review of lighting activities in Britain, we have endeavoured to make a similar review of lighting progress during 1954 in other countries. We are conscious that there are gaps in the review which follows, and we hope to fill these on a future occasion.

Reports from all countries indicate that the fluorescent lamp is being more widely used every day. In fact, it is said that in the United States fluorescent lamps now produce more total lumen hours than any other type of light source. The lamp, of course, has had its critics ever since lighting engineers themselves began to wonder whether their initial claims for it were quite justified. It was probably Ward Harrison who started us thinking when a few years ago he asked what was wrong with our 50 ft.c. installations, since when many others have studied the matter, particularly the glare aspect. Now come reports from countries as far apart as Germany and New Zealand that all is not quite well; the doubts, such as they are, are not about the lamps and their output but rather with the way in which they are used. The use of bare fluorescent lamps is usually condemned, though in New Zealand, where this is also generally true, it is strange to note that bare lamps are being installed in Government schools.

There is a tendency we think for architects to criticise lighting engineers for concentrating too much on fluorescent lighting. In some fields this criticism may be justified, but there can be no doubt that the fluorescent lamp has opened the door to lighting development where it was badly needed. This report is based on information supplied from all over the world; if the accent is on fluorescent lighting it is only because that is the way things are going at the moment. However, lighting engineers are also remembering that the tungsten lamp has much to commend it.

The fluorescent lamp has undoubtedly led to a general increase in the levels of illumination and many countries have either revised their lighting codes or have produced them for the first time. It would seem that most of them are now based on the British I.E.S. Code.

The public, as a whole, now seem to expect more light where in the past they appeared to be little concerned. This is certainly true of street lighting, whilst from the United States it is reported that "people are apt to think that a store is closed if its lights are not bright enough to compete with daylight."

Lamps

Fluorescent Lamps and Control Gear

During 1954 the 5-ft. 80-watt lamp (bi-pin) has made its debut for industrial lighting in Denmark although the 4-ft. 40-watt is still the most widely used fluorescent lamp. The 40-watt circular lamp has also become one of the standard lamps and a variety of luminaires using diffusers of opal glass, plastic and Orrefors crystal are now available. The new de luxe colour lamps are replacing the ordinary white and warm white lamps in offices, shops and restaurants and are found to be a great help in introducing fluorescent lighting into places where previously only tungsten lighting was used.

New fluorescent lamps introduced in Finland during the year include the warm white de luxe (3,000 deg. K.) in the 60 cm. 20 watt and 120 cm. 40 watt sizes, the cool white de luxe (4,500 deg. K) 20 and 40 watt, and the white (3,500 deg. K) 150 cm. 80 watt size. The new de luxe lamps and the older natural lamp are enjoying great popularity and the sale of other lamps is decreasing in their favour. As in Denmark, the 80-watt lamp is finding increasing application for industrial lighting.

In Italy the major development in fluorescent lighting

would appear to be the use of rapid start lamps which were introduced at the beginning of the year. Their reception by users has been most favourable and their use has spread rapidly particularly when one considers the limitations imposed on imports; whilst, in the past, the majority of fluorescent lamps sold in Italy were imported from abroad, home production has now reached the state where it can fully satisfy home requirements of normal fluorescent lamps and the Government, not unnaturally, wishes to protect the industry by restricting imports. The rapid start principle has also been applied to the starting of normal lamps particularly in out-door installations where low temperatures are experienced. This has led to a somewhat confusing variety of control gear which has almost completely supplanted the instant start ballast, over which it has distinct advantages (lower starting voltage, higher power factor, etc.) in such installations.

The most significant of the new fluorescent lamps introduced in the United States during the year is the high output rapid-start 5 ft. lamp. Originally a 110 watt source it is now rated at 100 watts. It has been found that the higher brightness calls for a little extra care in shielding and in avoiding reflections and that luminaire ventilation is important.

Discharge lamps.

Two steps taken in Italy to get better colour from mercury lamps are the introduction of the mercury/tungsten lamp (160, 260 and 450 watt) and the colour corrected mercury lamp. Both are finding ready acceptance and it is thought that the latter type is likely to be even more widely used if the cost can be appreciably reduced and the colour still further improved. The colour corrected lamps are available in 75, 120, 265 and 400 watt sizes, the latter being of American production and the most popular in view of the better colour. Two types of control gear are available, one suitable for starting at normal temperatures and the other suitable for temperatures down to 20 deg. below zero.

The colour corrected mercury lamps are also finding great favour in France both with municipalities and in factories. Sizes now on the market are 80, 125, 250 and 400 watt. Though the colour is not yet as good as that given by tubular fluorescent lamp, one of the advantages of these lamps is said to be that they can frequently be used in incandescent fittings with only slight modification to the fittings. In the United States the range of these lamps also includes 100, 175, 425, 700 and 1,000 watt.

A further development has been made in the American colour-improved reflector mercury lamp, the vaporised-aluminium inner coating of which has been omitted, the phosphor itself being used as the reflecting surface. The result is a large increase in light output since the light developed by fluorescence can be emitted from both sides of the phosphor coating. Because most of the light is directed downwards, these new lamps give especially good performance in existing industrial reflectors of the diffusing type.

The Germans have brought on to the market a 1,000-watt colour corrected mercury lamp giving an output of 48,000 lumens which is expected to find application for industrial and street lighting. 48,000 lumens is quite an output from one lamp, but the new 6,000-watt xenon high-pressure lamp gives 215,000 lumens. Between the two, as far as light output is concerned, lies the 2,000-watt xenon lamp giving 70,000 lumens. The most popular of the xenon lamps in Germany is the 160-watt (3,200 lumens) which is used for colour matching (see *Light and Lighting*, **46,** 391 (1953)) and which may become established as the standard colour-matching lamp in that country. The advantages are said to be that the spectral distribution is the same as that of daylight and does not vary with voltage or lamp life, and it gives the high uniform illumination necessary for colour matching.

It is reported from the U.S.A. that short-arc xenon lamps may find application in the motion picture production.

Incandescent Lamps

New lamps now being made in Finland include reflector floodlamps (beam 2 x 30 deg.) in 40, 75, 100, and 150 sizes, miniature lamps (e.g., bicycle and radio panel lamps) and infra red lamps. In France two new incandescent lamps for widely differing purposes have been introduced. One is a yellow lamp giving light of 5,825 A which, according to the Institut National de Recherches Agronomiques, is least attractive to insects. The lamp, available in 40 and 75 watts, is intended to be used either out of doors or indoors with windows open during the hot weather when insects can be a nuisance. Unfortunately, 1954, as our correspondent puts it, " n'a pas été particuliérement chaud," so the lamps have not yet had a very good test, but the indications are that they will do what they are intended to do. The other lamp is for colour cinematography and appears to be similar to a recently introduced British lamp. It has a colour temperature of 3,200 deg. K and is being used for most types of colour film work.

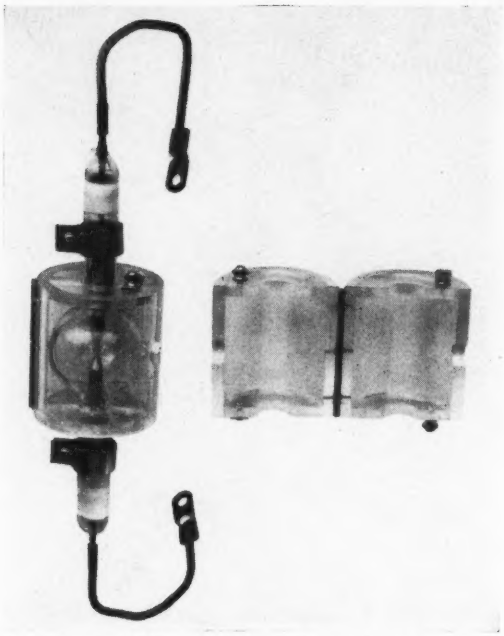
Luminaires

Little development is reported from Scandinavia. Because of the high cost of plastics, glass is still the most popular medium for diffusion with fluorescent luminaires, though there is some indication that the cost of plastics is coming down and that they may be more widely used in the near future. Some modern designs from Norway are illustrated, and some specially designed chandeliers are shown in the photograph of the interior of Lillestrøm Church. In Finland most fluorescent luminaires are made of steel or aluminium sheet, the reflectors being either enamelled or, in the case of aluminium, polished and anodised. As a rule suspended luminaires all give an upward component. The most popular tungsten luminaires are made of painted sheet, polished brass, etched opal glass, or " Perspex." Recessed fittings are also being made for use with reflector spot-lamps.

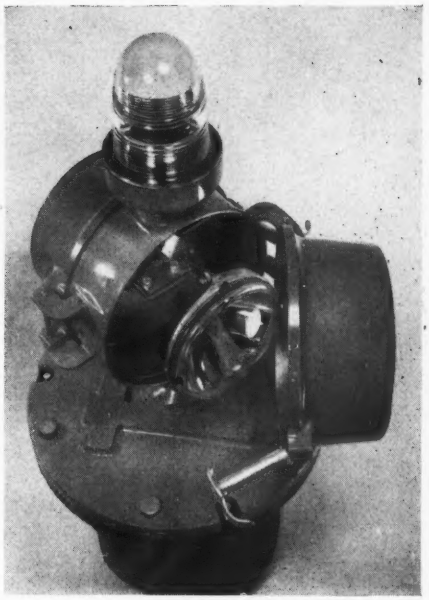
In Italy also, the importance of an indirect component in industrial lighting is now being appreciated. A new fluorescent industrial luminaire containing two 40-watt lamps gives an upward component of 20 per cent.; experience with these luminaires has also shown the value of ventilation in reducing dirt deposits on the lamps and reflecting surfaces.

The tendency with table and wall fixtures in Italy is towards a simplicity of line in accordance with modern ideas on functionality. The fixture illustrated is a good example of modern design; a feature of this particular model are the friction-operated swivels which keep the lamp in any desired position whilst allowing any adjustment to be made with ease.

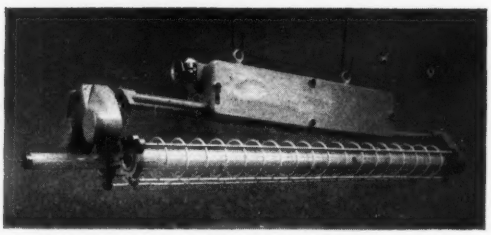
The search for good designs of fluorescent luminaires



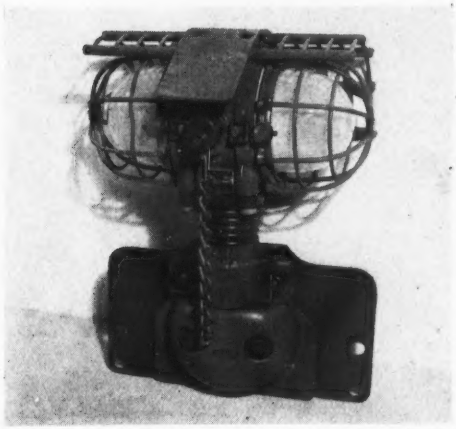
Experimental short-arc xenon lamp for projectors with carrying case. (United States.)



Danish approach lighting fitting. (Lyfa, Copenhagen.)

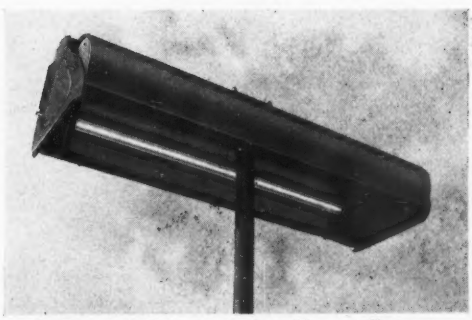


Explosion-proof fluorescent fitting. (Schanzenbach, Germany.)

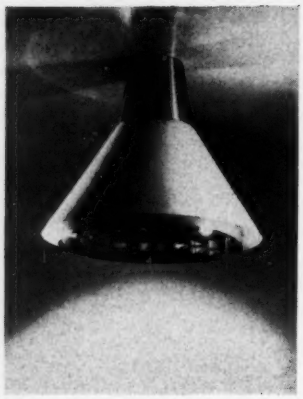


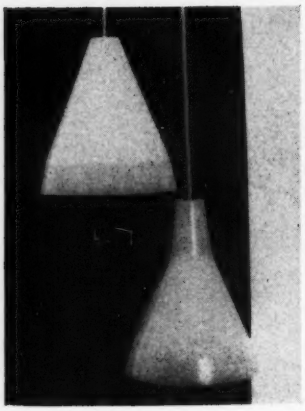
Conveyor lighting unit. (Schanzenbach, Germany.)

Flameproof unit incorporating signal switch and telephone connections. (Schanzenbach, Germany.)



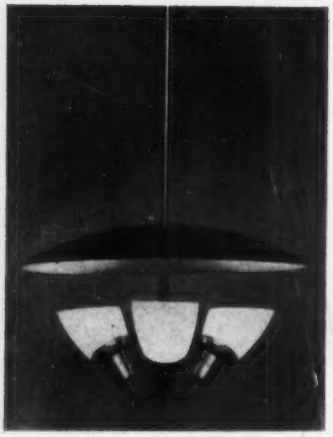
Railway platform unit, 2 x 40-watt fluorescent. (A.E.G., Germany.)



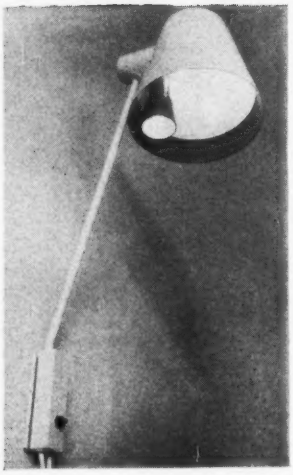


Three Finnish tungsten lamp luminaires.

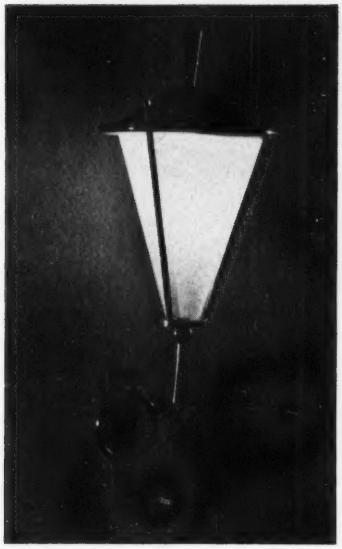
Two Norwegian tungsten lamp luminaires.



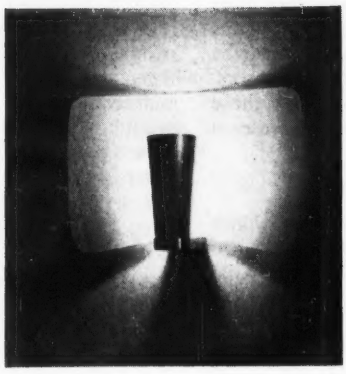
Finnish luminaire for hospital bed lighting incorporating a special fitting for night use.



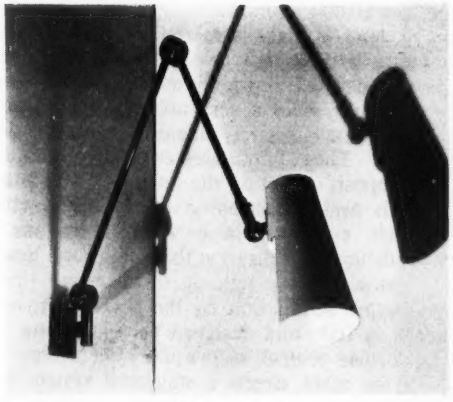
A French tungsten lamp luminaire. (*Lunel, Paris.*)



Four French decorative luminaires. (*Lunel, Paris*)



(*Pierre Disderot.*)



Italian adjustable wall unit. (*Stilvono, Milan.*)

still goes on in most countries, the combination of aesthetic appearance and sound technical performance being apparently as elusive as ever. Is it only imagination, we wonder, that in any luminaire using a 4 or 5 ft. lamp one can see every well-known industrial lighting fitting?

The idea of an upward component from industrial luminaires, which we cannot resist pointing out has been advocated and used in Britain for many years, has led the R.L.M. Standards Institute in America to make some radical changes in their specifications. The present solid-top reflector for R.L.M. fluorescent industrial units will be eliminated from the specifications and the new specifications will call for equipment with upward lighting.

From Germany comes a comment (perhaps a sigh) regarding the wide range of luminaires on the market. The Hanover Fair gives a pretty good survey of the field; it is seldom that any one firm produces anything completely novel as all firms in the industry are aware of new problems and requirements as they arise and each produces its answer, with the result that there come on to the market a large number of luminaires with only minor differences between them but all intended to do the same job. The year 1954 saw a lot of new luminaires for the circular fluorescent lamp. Ceiling-mounting units in plastic were also well to the fore, but the problems of packaging and temperature limitations have yet to be overcome before anything original is likely to emerge. Other fields which have shown some progress are those of street-lighting lanterns and explosion-proof fluorescent units.

Street Lighting

The preparation of a code of practice for street lighting seems to take a long time in any country. As our German correspondent points out, it takes time to do things properly and the preparation of a street-lighting code is not a matter to be taken lightly. In Germany many experts have already been engaged on the matter for some time; in the meantime, many local authorities are being pressed to provide better lighting, which they have to do at the risk that in a year or so their installations will become obsolescent under the new code. The only part of the code which has been agreed and published (German Standards Association DIN 504) is the table relating to illumination levels for different types of road.

It is reported that great efforts are being made to improve the street lighting throughout New Zealand, which has more cars per head of the population than any other country in the world. There is little difference between the popularity of the mercury and sodium lamps and there is still little fluorescent street lighting, probably because of the high cost of the imported lantern and the physical dimensions of the lantern.

Wellington is making big strides forward and is in the process of installing 350 140-watt sodium enclosed lanterns on its new trolley-bus routes. The South Island, and Dunedin in particular, is also increasing its sodium street lighting, using a similar design of enclosed lantern. The Auckland City Council, on the other hand, has remained strongly in favour of the mercury lamp and is rapidly increasing the mileage of roads thus illuminated (850 mercury-vapour lanterns have recently been ordered for the Auckland city area). Little is being done about side-street lighting, though the Wellington City Council is considering the possibility of using low-wattage sodium or mercury lanterns.

As most of the cities in New Zealand are also seaports care has to be taken that street-lighting installations using sodium or mercury lamps cannot be confused with navigation lights; this has created quite a problem as to the type of lantern to be used or an efficient method of screening. It is thought that the aero-screen lantern may provide a partial solution.

A new instant-start circuit for fluorescent tubes has been introduced on the Continent. This employs an externally striped tube (type TLM), the stripe being connected through a resistance to one of the cap pins. The circuit provides electrode pre-heating through a transformer, and a capacitor connected across the tube in series with part of the transformer winding creates a resonant voltage for starting. Whilst it might be claimed that the provision of a mains-connected stripe on the tube facilitates easy starting, it could be criticised on the grounds of electrical safety, if it were, perchance, connected to the phase side of the supply mains. The control circuit would not appear to offer any technical or economic advantage over conventional instant-start circuits except, perhaps, at abnormally low temperatures.

Though many of the provincial towns in Denmark have installed fluorescent lighting, the authorities in Copenhagen seem to be reserving their judgment fearing high maintenance costs with lamps on glow-switch starter circuits. On the Langebro bridge across the harbour in Copenhagen the TLM circuit is being tried out. The lantern, which has no reflectors or refractors, houses four 4 ft. 40-watt horizontal lamps in a clear plastic enclosure. They are mounted at a height of 27 ft. at a spacing of 90 ft.

Another interesting installation in Denmark is that using 8 ft. slimline lamps in the suburb of Hellerup on Bernstorffsvejen. The slimline lamps and lanterns are of Danish manufacture, the lamps being made by Skandinavisk Lysrors Fabrik A/S and the fittings by Elektroluma. The lanterns are similar to those used on the Langebro bridge; to accommodate the long lamp in the lantern the lamp is bent into a hairpin shape so as to keep the length to 5 ft. Each lantern holds two such tubes, the light distribution being then similar to that given by four 4 ft. lamps. These 8 ft. lamps give 5,300 lumens at an operating current of 430 mA with a total input of 105 watts; they have a life of 10,000 hours.

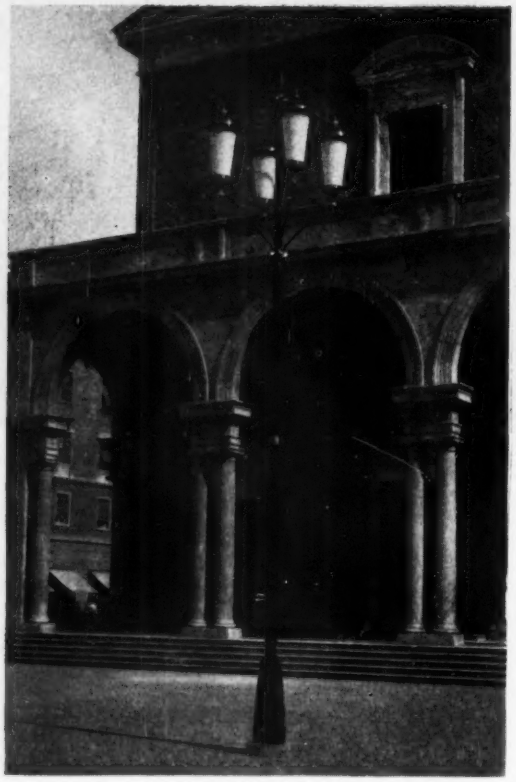
The general trend in Italy is to replace the enclosed types of luminaire with open types. One such popular type is the Infranor, which is widely used in Switzerland and France and which gives a very uniform distribution whilst at the same time effectively shielding the lamp and reducing the glare. These luminaires are well ventilated, so reducing the deposit of dirt on the reflector. The latest type to be used is oval in section, giving an asymmetric distribution which, especially in narrow streets, has a much higher coefficient of utilisation than the round types.

A recent example of the lighting of an entire small town is given by the installation by the Società Dinamo at Borgomanero in Italy and designed by Signor Ing. L. Novelli. The former central suspension system was removed. In all the main streets a staggered system has been adopted with lanterns containing two or three 40-watt lamps mounted on the existing buildings or on poles

Fiellsaten Bridge, Trondheim, Norway; 3 x 80-watt fluorescent lanterns.

Stalinallee, Eastern Sector, Berlin.

Langebro Bridge, Copenhagen; 4 x 40-watt fluorescent lanterns. (Lyfa.)



Lamp column in the Piazza Grande, Leghorn, Italy.
(C.G.E., Milan.)

Single lamp column at Belluno, Italy.
(C.G.E., Milan.)

The Piazza Grande at Leghorn. (C.G.E., Milan.)

and placed parallel to the street so as to reduce glare. In the secondary streets the arrangement is unilateral with single-lamp fluorescent lanterns mounted at an angle with the idea of making better use of the light output. Along the outer roads leading to the surrounding villages the arrangement is also unilateral with Mazda Infranor open type luminaires of treated aluminium mounted on concrete poles and using 150-watt lamps. The "swallow" type single-lamp fluorescent lanterns are of Belgian manufacture, which by virtue of the high quality aluminium reflector used are found to give a very uniform distribution. In all some 30 km. of roads (over 1,200 lanterns) have been lighted, the illumination level ranging from 10 lux on the central streets to 3 lux on the outer roads.

Other recent fluorescent street lighting installations in Italy were described by L. Richard in *Light and Lighting* **48,** 53 (1955). German fluorescent street lighting fittings were described in *Light and Lighting* **47,** 75 (1954).

Floodlighting

Floodlighting is probably one of the more satisfying jobs of the lighting engineer, perhaps because of its appeal to the public. During the last two or three years it has been stimulated in the Commonwealth by the Coronation and by the Royal Tour and in general by the spectacular efforts of the French.

Australia and New Zealand put on very good shows during the Royal Tour and many local bodies and private concerns have maintained these installations for use on special occasions and at Christmas. In addition new installations are springing up and the trend seems to be to use coloured floodlighting wherever possible.

The "Sound and Light" spectacles in France began some years ago and have become quite an important aspect of the tourist industry. (See Gaymend *Light and Lighting*, **47,** 133 (1954).) 1954 saw further developments, not only in the chateaux illuminated but in technique. Previously most of the lighting was in white but now coloured light is being used to a great extent, the coloured effects being obtained not by the use of filters but by using tinted reflectors; the result is light tints which are very effective. Where colour change is required batteries of projectors are controlled from a colour mixing apparatus, known as a "chromoselecteur," which brings in the various projectors and colours as required.

The Infranor projector, which has a special optical system with multiple reflectors giving a rectangular beam with a very uniform distribution, is used widely in France and in Italy where the popularity of floodlighting has increased rapidly during the last twelve months. One of these projectors alone, fitted with a 3,000-watt filament lamp, illuminates the ancient wall of the City of Pietrasanta for a length of 200 metres. The same type of projector has been adopted recently for illuminating with excellent results the Church of S. Michele at Lucca, the Palazzo del Governo at Perugia, the Church of S. Bernardino and S. Maria at Collemaggio in Aquila, the ancient Tower of Rovigo and many other monuments. A different technique is used for the façades of the Castello Angioino (Naples) where blended light is provided by 30 projectors fitted alternately with mercury vapour lamps, colour-corrected mercury vapour lamps and filament lamps.

In contrast to the installations mentioned above is that at the Basilica of S. Francesco da Paola (Naples) which is one of the most outstanding installations of the year. As the intention was to give prominence to the details of the architectural features, leaving in the shade the surrounding buildings which are in a deplorable state, and at the same time to maintain the fundamental symmetry of the whole, resort was made to short range projectors located almost at ground level. Low and medium power incandescent floodlights and fluorescent lanterns fitted with slimline lamps are used. An effect particularly expressive is obtained in the lighting of the arcades, the columns being seen in silhouette against the intensely illuminated background. The cornice of the arcades and the central frieze are illuminated with fluorescent lanterns, whilst the rest is illuminated by incandescent floodlights from 300-1,500 watts.

There is not a lot of information about floodlighting in the United States, though it would seem that some lead is given in this field from Washington where several of the Government buildings are now permanently floodlit. The latest addition is the National Archives Building, an imposing structure of classical design. It was built in 1931 and provision was made at that time for floodlighting; this has now been installed with concealed projectors around the base of the building and on two tiers. The lighting was designed so that the brightness of the building increased from 8 lm/ft^2 at the bottom to 20 lm/ft^2 at the top.

Sports Lighting

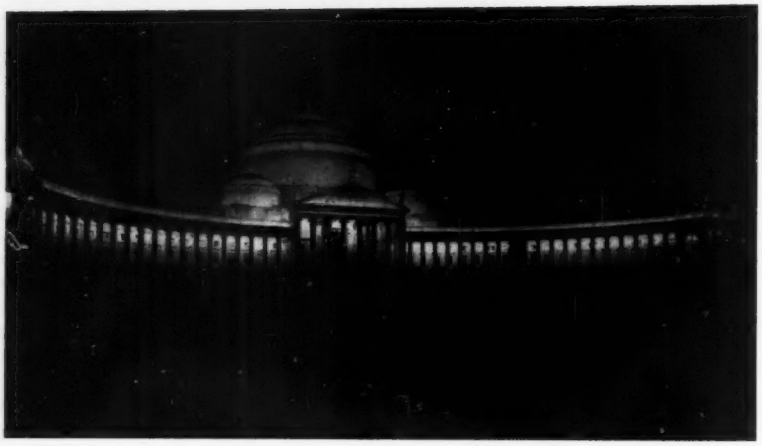
The demand, both by those who take part in sports and those who only watch, for facilities by night shows no sign of slackening off. Neither are night time sporting events restricted geographically for it would seem that almost every country now goes in for night games and athletics. The only restriction (not uncommon in other fields of lighting) is that of cost. There is no doubt, for example, that many football clubs throughout the world would like to have permanent floodlighting installations but many of them have to be satisfied for the time being with relatively simple installations. Such is the case in New Zealand though the Wellington City Council has recently installed the first high level floodlighting scheme in the Dominion at the Basin Reserve Sports Ground where it has proved an undoubted success.

An installation has recently been put into the Copenhagen Stadium where four 100-ft. towers in each corner each carry 15 Lyfa 1,500-watt projectors. As the stadium is used for both football and athletics the scheme had to be such that both the field and the track could be lighted. The projectors are therefore fitted with two locking devices so that in one position they are adjusted for football and when they are required to light the track they are all swung into the second position.

Until a year or two ago there was no floodlit stadium in Italy but during the last year there has been considerable activity in this direction. A typical example is that at the Milan Arena where eight batteries each of twelve 1,500-watt projectors are installed on 35 metre high towers giving an average illumination on the field of 13 lm/ft^2. The lamps used are rated at 73-volt but are actually run during the game at 80-volt. Reports state that due to the height of the projectors which keeps them out of the normal line of vision of spectators the installation is virtually glare free.

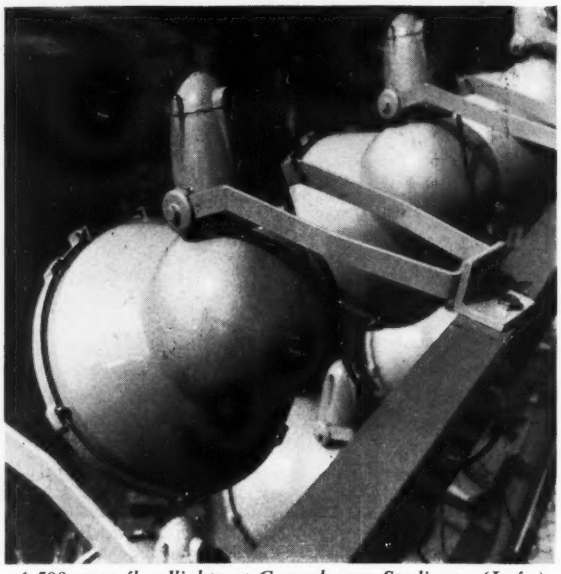
There are many sports lighting installations in South

The Continental-Gummiwerke building, Hannover. (Zeiss Ikon AG Goerzwerk, Berlin.)

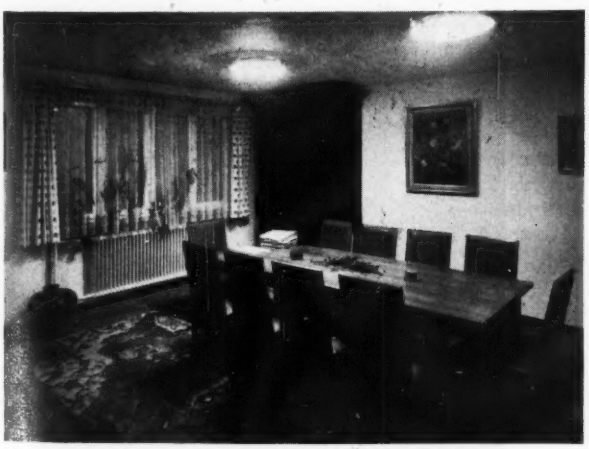


The Basilican church of S. Francesco da Paola, Naples. (C.G.E., Milan.)

Chateau de Vincennes. (Cie des Lampes Mazda, Paris.)



1,500-*watt floodlights at Copenhagen Stadium.* (*Lyfa.*)



Circline fluorescent lamps in a residence.

America, two of the more recent being at the Shell Petroleum Company's sports ground at Lagunillas in Venezuela and the Cardon Baseball Field in the same country, the equipment in both cases being specially designed and supplied by a British firm. In the former installation the floodlights are mounted on eight 75-ft. towers, six of which carry 12 fittings and the other two 24 each.

Interior Lighting

Industrial and Commercial

Most of the information received about industrial lighting has come in the form of photographs of installations which we will allow to speak for themselves. Other information on lamps and luminaires will be found elsewhere in this review.

Little has been mentioned about shops by our correspondents, most of them dismissing the subject by saying that fluorescent lamps are used for general lighting with spotlights for effect and to provide the necessary sparkle which all seem to agree is necessary in shops.

Luminous ceilings are now appearing in most countries though not perhaps on such a grand scale as in the United States. No doubt economics have something to do with this, but there is also the impression that luminous ceilings are not quite all they were made out to be. However, new types of ceilings are being developed and that using corrugated vinyl plastic sheeting supplied in rolls is finding application and has certain economic advantages over other forms of lighting.

The latest development in this field from the United States is the so-called "electrical ceiling." In the new engineering building of the Douglas Aircraft Company, at El Segundo in California, seven basic services have been incorporated into the Wakefield ceiling which has been installed; these are (a) lighting, (b) acoustical equipment for noise control, (c) power distribution for office equipment, (d) telephone services, (e) public address system, (f) air conditioning and (g) the sprinkler system. The installation covers two large engineering-drafting areas each 210 ft. square and several offices of varying size. In each of the large drafting areas 1,800 8-ft. 3,500-deg. K lamps are installed, giving a maintained average of 90-100 lm/ft^2.

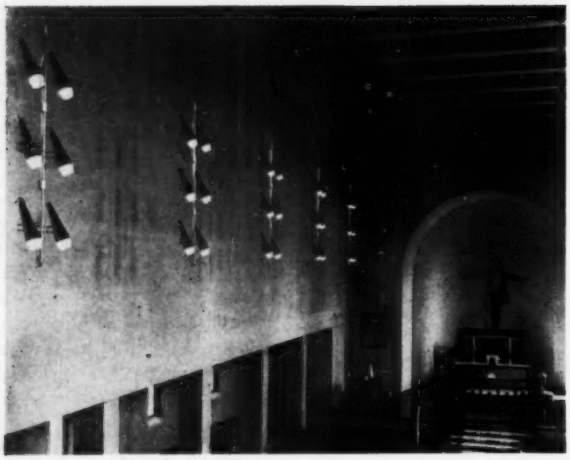
Another interesting installation is that at the Manufacturers Trust Company building in New York. The ceiling consists of panels of the corrugated vinyl plastic mentioned above cut to size before delivery on the job and supported on an aluminium grid framework above which are cold cathode lamps. The building itself (five floors above street level) is of interesting construction, being faced entirely with glass on the Fifth Avenue and 43rd Street frontages. The building is therefore of striking appearance both by day and night; the lighting is used every day from early morning until midnight so that the building itself is used as an attraction to advertise the bank. The interior of the building is clearly visible from outside; what has been done in effect is to apply shop window lighting on a grand scale, throwing so much light down from the ceilings that transmitted light from the interior greatly exceeds the reflected light from the glass so that external reflections become insignificant.

Churches

One field in which there seems to be a renewed interest is in the lighting of churches. Not that the field

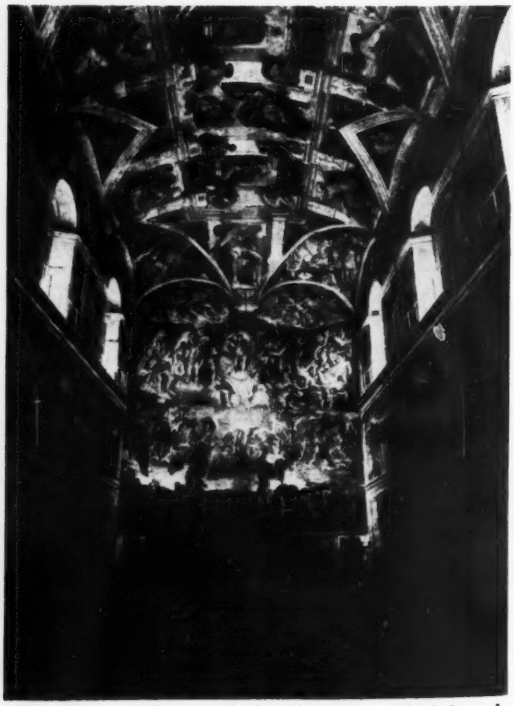
A church in Finland.

The new church of St. Kunigunden in Bamberg. (Siemens-Schuckert, Berlin.)



Lillestrom church, Norway.

The Constantine Room in the Vatican. (Buini and Grandi, Bologna.)



The Sistine Chapel of the Vatican. (Buini and Grandi, Bologna.)

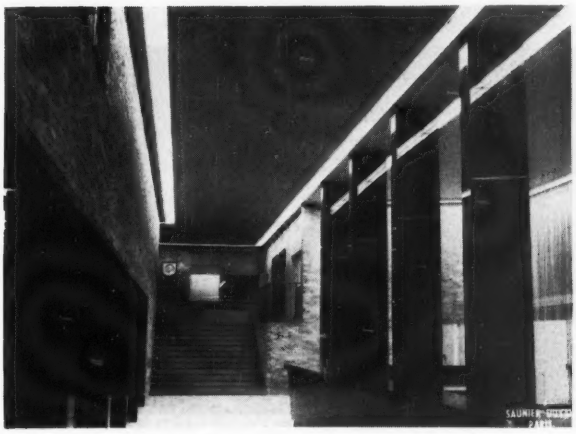
(*Zeiss Ikon AG Goerzwerk, Berlin.*)

Three examples of lighting in banks:—

(*Top*) *Berliner Bank, Charlottenburg.*

(*Centre*) *Banque Louis Dreyfus, Paris.*

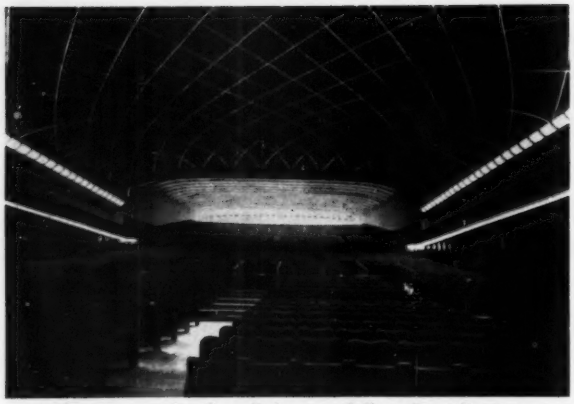
(*Bottom*) *Manufacturers Trust, New York.*



has been altogether neglected, but nothing startling seems to have happened during recent years. Though the fluorescent lamp has been used in one or two churches it can hardly be said to have been generally accepted.

The two installations from Finland and Norway are both of tungsten lighting, and look typically Scandinavian. The chandeliers in the Lillestrom Church, Norway, were designed by Kjell Munch of A/S Christiania Glasmagasin. The church is lighted by six of these chandeliers placed in a single row along the wall facing the windows. The aisles are lighted by wall lamps on the pillars.

The outstanding lighting installation in S. Maria Maggiore, in Rome (see *Light and Lighting*, **47**, 360 (1954)), led to the lighting of more churches by means of projector and reflector lamps. One such example is the Basilica of S. Petronio, in Bologna, a gothic-style church



Auditorium of the Palazzo della Conciliazione, Rome. (Buini and Grandi, Bologna.)

Dining room in a hospital, Finland.

Shop in Auckland, New Zealand.

with bare, vaulted ceilings where over 100 PAR-38 lamps have been used.

The Sistine Chapel in the Vatican has been relighted, using both fluorescent and tungsten lamps located on the window sills.

Schools

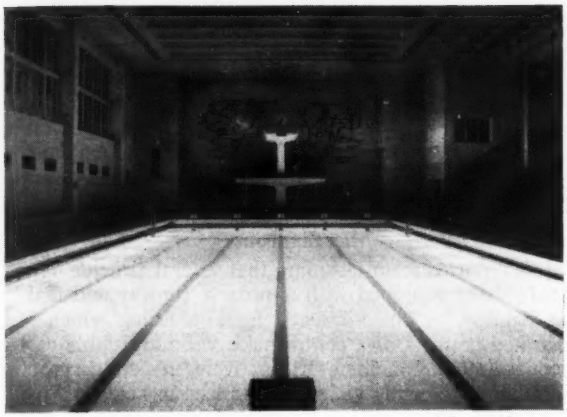
The only thing we have to report under this heading is that all new Government schools in New Zealand (and they are the majority) are installing fluorescent lighting. (France please note.) The Government appear to be standardising on a single 5-ft. 80-watt luminaire without any louvre or diffuser, the luminaires being mounted straight on to the ceiling in a continuous line. Fluorescent lighting is almost entirely confined to classrooms where the initial illumination is around 40 lm/ft^2. In corridors and cloakrooms the well-known opal globe is used.

Decorative Lighting

With a history in the arts such as she has, it is not surprising that Italy should produce some good examples of decorative lighting. It is only in the last year or so that the majority of us have been able to learn what they are doing in that country, and the least we can say is that on decorative lighting they have given us something to think about. Our correspondent, Mr. Benzio, sums up the subject of decorative lighting as follows: "The field of decorative lighting is one which leaves the designer less attached to pre-set schemes, but requires on the other hand a marked artistic aptitude and a considerable acquaintance with the various types of light sources. Here the economic and functional factors, though still important, yield to aesthetic factors which become predominant. Nevertheless, a close collaboration between the architect and the lighting engineer is always desirable in order to obtain the best results with the least cost."

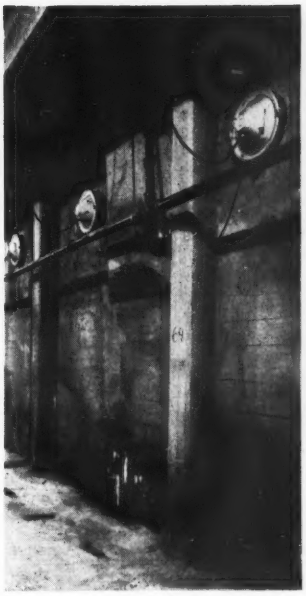
A good example of such collaboration is the installation at the Palazzo della Conciliazione in Rome, where the illumination forms, so to speak, a complementary part of the architecture. The ceiling of rhomboidal panels forms long doucines in which are contained, without a break, over 1,000 metres of 13 mm. cold cathode fluorescent tubing operating at 15 mA. The ceiling of the gallery contains 236 metres of cold cathode tubing operating at 100 mA and 100 filament lamps of 40 watts in the end doucine. The illumination of the hall is augmented by a series of cold cathode lamps contained in the longitudinal cornices along the sides giving direct lighting, whilst 150-watt projectors arranged within the cornices and directed upward illuminate the ceiling, thus diminishing the brightness contrast between the dark panels and the channels containing the fluorescent tubes.

Particular care has also been given in Italy to the lighting of picture-galleries, museums and frescoes, where the colour and direction of the light are of fundamental importance. In the Brera picture-gallery (Milan), after several years of trials and experiments, the lighting has been completely redesigned using fluorescent lamps. The lamps are installed behind opal glass screens which serve also for the natural daylight, so that as close a similarity as possible is obtained in lighting both by day and by night. Each reflector contains three 40-watt hot cathode lamps, two being white and the other having a red tint, this combination having been judged the most suitable by the commission that supervised the installation. In all more than 1,100 lamps have been installed; the average illumination is 100 lux.



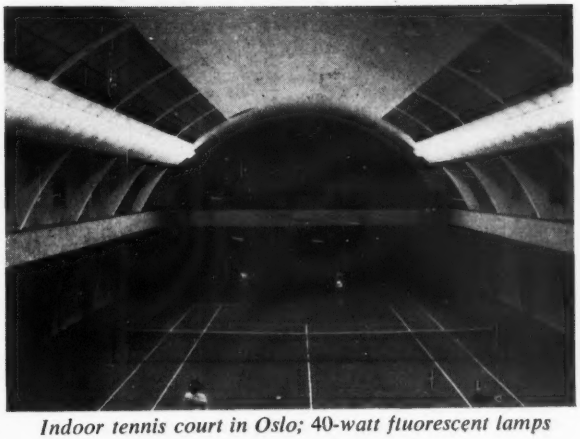
(Zeiss Ikon)

A swimming pool in Bremen. Top left picture shows underwater lighting only in use; lower picture shows general lighting only in use. Picture on right shows access to the underwater lights.

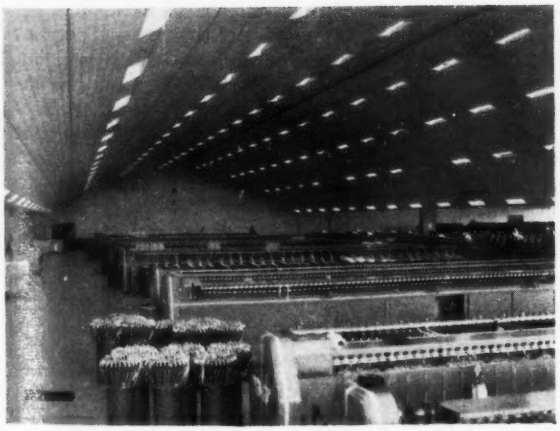


(Zeiss Ikon)

(Siemens-Schuckert)



Indoor tennis court in Oslo; 40-watt fluorescent lamps screened by metal louvres.



A new Norwegian rayon spinning mill.

A factory in France using 125-watt colour corrected mercury lamps in standard dispersive reflectors. (*Claude Paz et Silva.*)

Example of office lighting technique applied to an industrial interior in the United States.

A number of equally interesting installations have recently been completed in the Vatican City, that in the Sistine Chapel being mentioned elsewhere in this review. Another is that in the Constantine Room (and in the other Raphael stanzas), where the paintings are illuminated from a central pedestal containing nine 30-watt white fluorescent lamps and eight 100-watt tungsten lamps.

Miscellaneous

It is reported from Denmark that several airfields have recently been equipped with approach, runway and taxiway lighting. The approach lighting fitting which is illustrated consists of a centre piece with adjustable cast silicon alloy lampholders with covers in weatherproof plastic and protecting glass and top lens in heat resisting glass. The lamps are of the sealed beam type. The fitting is mounted on a tube which, via a breakable coupling, is connected to the flush mounted base containing the transformers. The weight, only four kilogrammes, is of importance in view of the possibility of the fitting being run into by an aircraft. The materials are such that in the event of a collision no sharp parts will penetrate the tyres of the aircraft. PVC enclosed cables are used.

Little mention has been made in this report of cold cathode lighting. However, there are indications that it is regarded with favour by some architects because of rising labour costs in most countries which is bound to favour anything which reduces maintenance costs.

Maintenance is another thing which in most countries is at last beginning to receive the attention it should. Manufacturers of lighting equipment now seem to be paying more attention to maintenance as a fundamental aspect of design and users are realising that expenditure on a first-class installation is a waste of money unless they keep it in first-class condition. Service goes hand in glove with sales in so many fields of industry that consumers and users almost take it for granted; sales and service should surely be established in the lighting industry—and for the small user as much as for the big one.

Another development, not strictly lighting but one which may eventually enable the lighting engineer to widen his field, is that of the solar battery which, in the United States, has been used to convert sunlight into useful amounts of electricity. In its present experimental form it is stated that the Bell solar battery can achieve a 6 per cent. efficiency in conversion. This approaches the efficiency of the steam and petrol engines, whilst other photo-electric devices have never achieved more than 1 per cent. It is expected that the efficiency may be increased to 10 per cent. The battery is composed of strips of specially prepared silicon which convert sunlight directly into electrical energy; one square yard of surface under full sunlight will produce enough electricity to light a 50-watt lamp.

Acknowledgments

Our thanks are due to those who have kindly co-operated in preparing this review including Bent Knudsen (Denmark), Jean Chappat and B. Henri-Martin (France), E. Päivärinne (Finland), Ernst Rebske (Germany), Virgilio Benzio (Italy), Rolf Aspestrand (Norway) and N. E. Hammond (New Zealand). The material on the United States is taken by permission from the I.E.S. (America) annual progress report and from other sources.

A 'Duplo' Headlight with Asymmetric Passing Beam

A proposal for combining the advantages of the European and Anglo-American passing beams.

By J. B. de BOER*

The problem of motor-car headlighting took on a new aspect when, after the Second World War, a great number of cars appeared on the European roads equipped with headlights of the Anglo-American type. Difficulties arose due to the rather important differences in light distribution of the passing beam of these latter and that of the European construction. Whereas the headlights of the Anglo-American type show an asymmetric beam pattern such that, for right-hand traffic especially, the right-hand verge of the road is properly illuminated, the passing beam of the European headlights is symmetrical and shows a distinct light-dark boundary just under the horizontal plane. At the same time the light radiated in upward directions, which might dazzle the oncoming traffic, is intercepted as much as possible in this latter type.

The premises upon which the designs of the two light beams have been based are obviously different. Whereas the designers of the Anglo-American beam pattern have postulated the requirement of a good illumination of the road along the right-hand side (for right-hand traffic) and the reduction of the glare of oncoming traffic has been subordinated to this primary requirement, the European designers aimed in the first place at a limitation of glare (i.e., the promotion of comfort vision when driving) and, within the possibilities of this limitation, tried to achieve the best possible illumination of the road. As a consequence of this fundamental difference in concept a passing beam was evolved for Anglo-American headlights which, in comparison with the European passing beam, gives an illumination of the right-hand verge of the road of about three times the strength of the latter, though at the same time the oncoming traffic is dazzled also with a three-fold intensity†.

It is obvious that when two motor-cars meet each other of which one is equipped with headlights of the Anglo-American type and the other with European headlights, the driver of the latter car is badly handicapped since he has a rather poorly illuminated road in front of him and is subjected to the glare of the headlights of the oncoming car. This is the reason why the simultaneous presence of headlights of such a different light distribution on the same roads gave rise to the study of the problem of motor-car headlighting from an international point of view. The final object of this international work, with which the ISO (International Standard Organisation) and the CIE (Commission Internationale de l'Eclairage) have been charged, is to arrive at a uniform system of headlights, thus facilitating international road traffic and also permitting, at least from a technical point of view, an unhindered export of headlights and lamps.

An essential condition for the serviceableness of motor-car headlights is the correct aiming of the headlights on the motor-car. For both sorts of headlights too high an aiming generally improves the illumination of the road, but dazzle to oncoming traffic is also considerably increased. A disturbed or incorrect aiming of the headlights, a fault which unfortunately occurs rather frequently on the road, may therefore have a serious effect on visibility and thus for the safety of traffic. A driver driving with headlights adjusted too far downwards, whatever the type may be, who has to pass a motor-car with headlights adjusted too far upwards must realise that visibility for him in this situation has been reduced to such an extent that only a very low driving speed is safe. The correct aiming of the headlights for both of the types described above is therefore of the utmost importance.

Much value must therefore be set upon the ability of the layman to judge the correctness of the aiming, a possibility which must be offered by the headlights themselves by means of their light distribution. There is also a difference in this respect between the Anglo-American and the European type. Whereas the passing beam of the former does not possess a characteristic feature by which the correct direction of the beam in respect to the horizontal plane and the longitudinal axis of the motor-car can be verified, the European passing beam shows a distinct light-dark boundary line, the so-called cut-off, as already mentioned above. The European passing beam is properly aimed when this cut-off is seen at the correct angle to the horizontal plane. For the American headlights the aiming takes place with the aid of the so-called "hot-spot" (a bright centre) in the main beam, whilst the tolerance in the difference between the direction of the main beam and that of the passing beam is relied upon to guarantee that the passing beam also is properly directed.

Recapitulating the advantages and disadvantages of the characteristic differences between the Anglo-

* Light Technical Laboratory, N.V. Philips' Gloeilampenfabrieken, Eindhoven.

† For further details see, e.g.: J. B. de Boer and D. Vermeulen, Motor-car Headlights, Philips Technical Review, **12**, 305 (1951).

American and the European passing beams, we obtain the following picture: —

(i) *Illumination of the road.*

The Anglo-American passing beam throws at least as much light on the left-hand half of the road as the passing beam of the European headlight and along the right-hand verge about three times as much.

(ii) *Dazzle.*

The dazzle caused on a straight road by the European passing beam in the eye of the driver of an oncoming car, when expressed in illumination, amounts to only about one-third of that of the American beam.

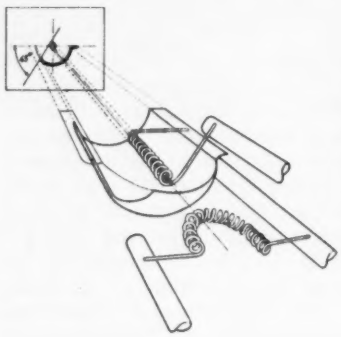


Fig. 1. If the part of the screening cup shown in thin line is removed the light is not intercepted and is reflected to the right just above the horizontal. The part removed is indicated on the projection.

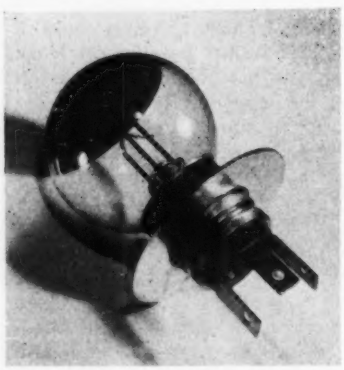


Fig. 2. A "Duplo" lamp with partly removed cup.

(iii) *Possibility of aiming.*

The criterion for the aiming of headlights of the Anglo-American construction does not lie in the passing beam but in the main beam. The aiming of the European passing beam can take place with the aid of the cut-off.

The feature mentioned under (i) must certainly be considered to be an advantage for the Anglo-American headlight, whereas the properties mentioned under (ii) and (iii) must be looked upon as advantages of the European passing beam. It is obviously important for us to investigate whether or not the possibility exists of combining these advantages in one headlight.

A practical possibility can be found, starting from the European construction of the lamp in which the filament for the passing beam is placed in a screen cup. In the European headlights used up to the present this cup is symmetrical in respect to the vertical plane through the axis of the headlight, and the two side edges of the cup are in a horizontal plane some tenths of a millimetre above this axis. The cut-off on a screen obtained by the European passing beam may be conceived as being composed of projections of these edges of the cup, made on the screen by separate parts of the reflector.

The advantage mentioned under (i) of a higher illumination, especially along the right-hand verge of the road, can now be obtained by taking away a part of the cup, as indicated diagrammatically in Fig. 1. In this way a part of the bottom half of the reflector receives light direct from the filament. This light is radiated approximately horizontally and slightly upwards in directions corresponding with the right-hand verge of the road. The photograph of Fig. 2 gives an impression of the actual construction of a "Duplo" lamp modified in this way.

The right-hand side of the cup, which is projected by the reflector in the left-hand half of the beam, is maintained and consequently in this part of the beam not only is the cut-off maintained but the light intensity above the horizontal is not increased. It is thus possible, in principle, to combine the three advantages mentioned above. A suitable construction of the lens of the headlight is prerequisite. A normal lens often gives the light rather a strong horizontal divergence. If a similar lens is used for a headlight containing a lamp with partly removed cup, the light radiated by the reflector in right-hand and upward directions will diverge sideways so strongly that a part of it will arrive in the left half of the beam. An inadmissible degree of glare would thus result.

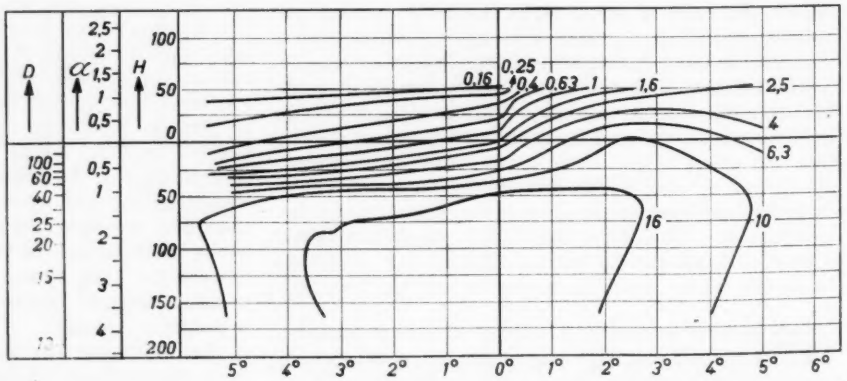


Fig. 3. Light distribution from a European headlamp with modified "Duplo" lamp. The curves (figures in Lux) represent isolux lines on a screen 25 m. from the headlamp. Divergence from vertical plane of symmetry of the headlamp is shown in degrees. Vertical scale shows distance H (cm.) from horizontal plane through focus of headlamp and corresponding scales indicate direction of radiation α (degrees) in respect to horizontal, and distance D (metres) on road in front of headlamp.

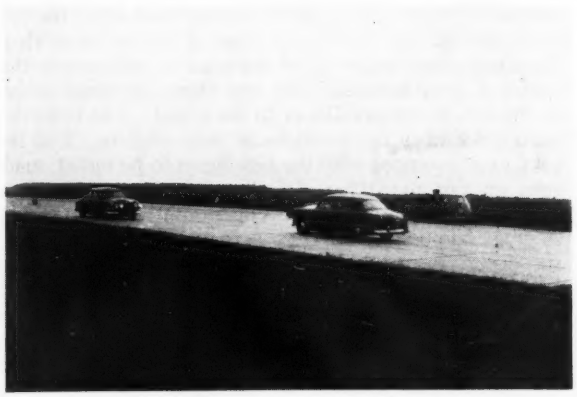


Fig. 4. The two test cars on the circuit.

With a beam made asymmetric in this way provision must be made that the part of the lens through which the light radiated in upward directions emerges causes practically no horizontal divergence.

On the basis of these principles a number of experimental headlights have now been made, using normal reflectors and lenses. The type of lens selected gives very slight divergence to the light transmitted through its left-hand side just under the horizontal median plane. The lamps used deviate from the normal European type as indicated in Fig. 1. Fig. 3 shows the light distribution obtained. It must be observed in this connection that the beam thus obtained must not be considered as being the most favourable one for the purpose in view, since it has been obtained with a normal reflector and lens, and not ones specially constructed for the purpose. (A further

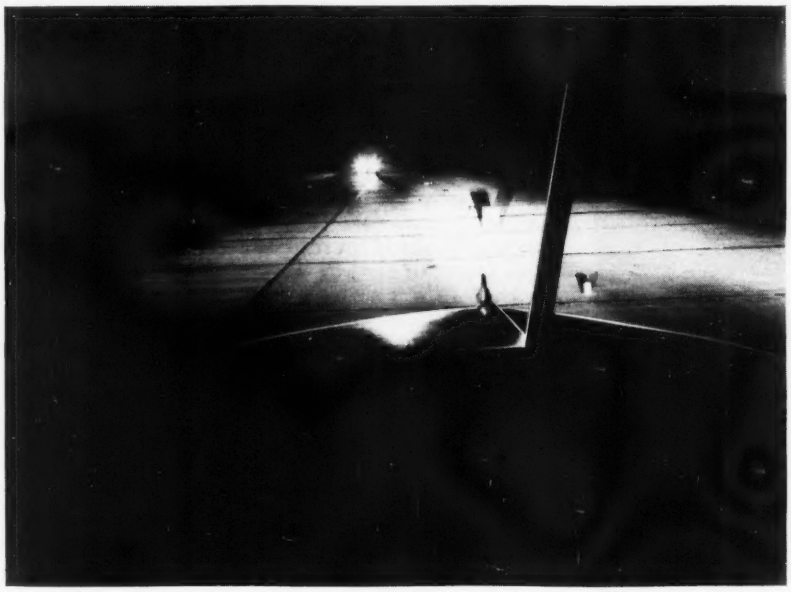


Fig. 5. The test road during one of the runs as seen from one of the cars. The width of the road is marked with tins. Along the right-hand side an object is visible in the light of the headlamps of the same car. The silhouette of an object is visible in the centre of the road just in front of the oncoming car.

Fig. 6. The front of one of the test cars with frame mounting four headlamps. The frame is rotatable about a horizontal shaft (just in front of number plate) which allows for a quick and reproducible change in the aiming of the headlamps.

limitation of the intensities in upward directions in the left-hand half of the beam, for instance, is certainly possible by use of a properly designed lens.) As regards the absolute value of the luminous intensity of this beam, attention must be drawn to the fact that, in accordance with recent developments in lamps for European headlights, 45-watt lamps were used. Furthermore, the lamps were made with a yellow bulb which was provided with an anti-fog shield on the front side (as shown in Fig. 2) by which direct light from the filament is prevented from being radiated in upward directions; by this means the illumination above the horizontal plane, when driving in a haze, is restricted as far as possible, whilst the glare at the moment of actual passing is also somewhat reduced.

In order to be able to judge the reliability of this experimental asymmetric European passing beam, visibility tests were carried out for which a method was followed which in principle corresponds to the procedure followed in the international tests for motor-car headlighting made at Zandvoort in 1949 under the auspices of the C.I.E. The tests were carried out on a straight road in clear dry weather.

The road surface was a light-coloured concrete. A

Fig. 7. The apparatus for recording the visibility distances is provided with a registration disc of waxed paper on which lines can be drawn with four styluses fixed to the armatures of four relays. The arc through which the disc turns is proportional to the distance covered by the car. The apparatus was copied from a model designed by Bosch of Stuttgart.

Fig. 8. Apparatus for controlling lamp voltage; radio communication with the supervising car was also carried out by the same assistant.

number of objects were placed on the road along the left-hand, middle and right-hand verge at regular intervals in the longitudinal direction of the road in such a way that within a given distance only one object occurred (either to the left, in the middle, or to the right). The observers were ignorant of the positions of these objects. Two test cars, each equipped with the headlights to be tested, made runs on this road (Fig. 4). In addition to the driver-observer, there were two passenger-observers in each car. A great number of test runs were made and the team of six observers regularly exchanged places. Before the beginning of each test run a motor-car was placed at either end of the track. Both cars were started simultaneously by a command given by radio, accelerated in the same way and covered the test circuit at a speed of 60 km/h. An assistant in the back seat of the car maintained the voltage of the lamps at the correct value.

The points on the road at which the various objects were seen were now registered for each observer by means of recording units in the two cars. From these recordings the visibility distance for each observer and the distance of the oncoming car at the moment of observation can be determined for each object. Figs. 5, 6, 7 and 8 give further data regarding the test method.

Since actual road conditions can be reproduced only approximately in this type of test, absolutely definite conclusions as to the visibility distances which would have been found in practice cannot be drawn. The value of the results of experiments such as these lies, therefore, more in the possibility of comparing headlights of different kinds. We have therefore compared the experimental European headlights described above with a new American headlight of the well-known all-glass sealed beam type, which was placed at our disposal by Mr. V. Roper, of the General Electric Co., Cleveland, Ohio. The light distribution of these new sealed beam lamps is shown in Fig. 9.

The tests were carried out in such a way that the most reliable comparison between the two types of headlight was obtained, namely, by interchanging the headlight combinations systematically after a number of runs on every test-night. In the exchange of seats by the observers and in the location of the objects on the road, care was taken to ensure that each observer made the same number of observations with respect to each object for each combination of headlights.

The results of these tests are shown in Figs. 10, 11

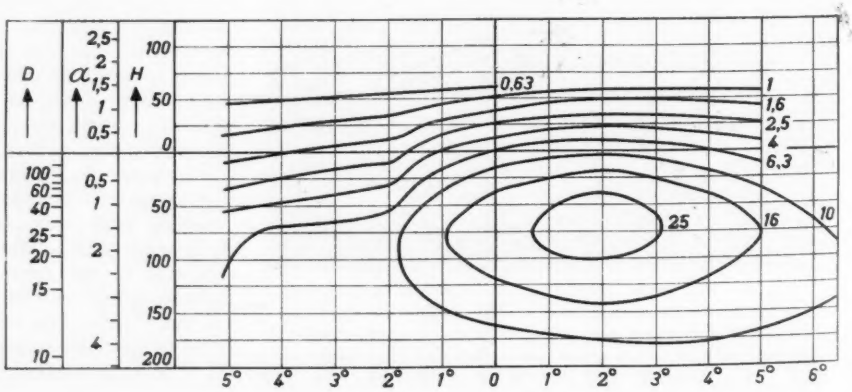
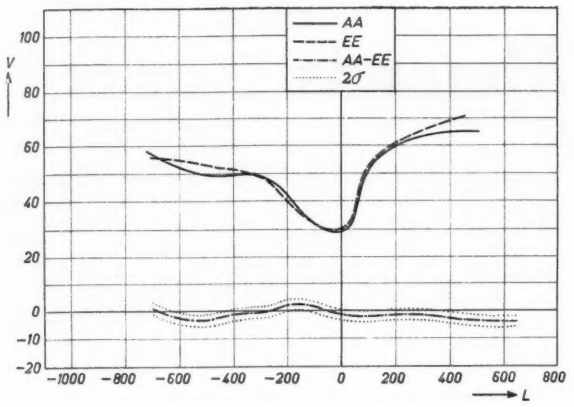
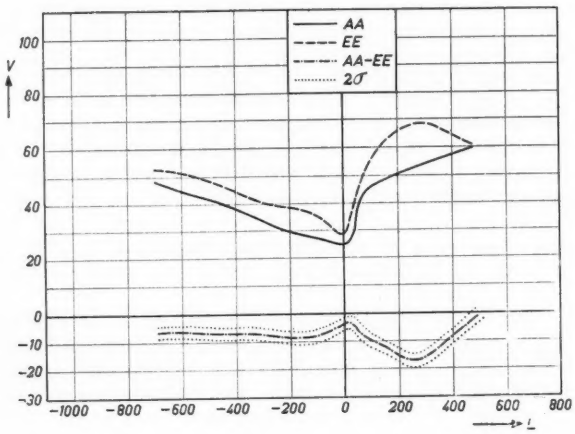
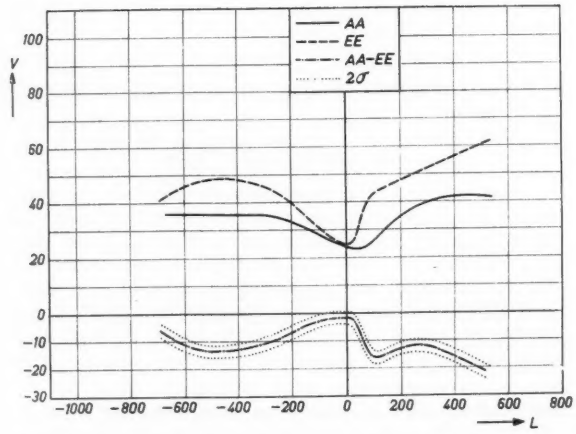


Fig. 9. Light distribution of the new Sealed Beam headlamp with which the asymmetric European passing beam was compared. (See Fig. 3.)







Figs. 10, 11 *and* 12. *Visibility distance V as a function of the distance L between the motor-cars for objects along*
Fig. 10—*the right-hand verge*
Fig. 11—*the middle of the road*
Fig. 12—*the left-hand verge.*
AA—new sealed beam lamp
EE—asymmetric European headlamp
AA-EE—difference between the visibility distances for AA and EE.

and 12 in curves representing the visibility distance V as a function of the distance L between the motor-cars. The latter distance has been plotted along the abscissa in such a way that negative values correspond with the distance before the meeting point and positive values with the distance after the meeting point. The passing beam only was used in the experiments, both before and after the meeting point. Each curve represents the result of a total of approximately 800 observations. Nearly 5,000 observations have consequently been used in the results represented here.

A curve has been plotted in the figures representing the difference between the visibility distances found for the two headlight systems and further, by means of the dotted curves, a divergence band beside this difference curve indicating the statistical value of the differences found. The significance of this divergence band is that, on repetition of the tests, in 19 out of 20 cases differences will be found which lie within this divergence band. The figures show that the visibility along the right-hand verge for the two types of headlights compared is equivalent, and that an appreciably more favourable visibility is obtained along the middle of the road and along the left-hand verge with the asymmetric European passing beam.

Another problem is the question of the simultaneous use of the different headlights on the same roads. As already stated at the beginning of this article, the driver of the car with normal European headlights is badly handicapped by an oncoming car equipped with passing beams of the Anglo-American type. This is true not only as far as visibility distances are concerned, but also from the point of view of eye-comfort whilst driving. In a meeting on a straight road between a motor-car with normal European headlights and one with the new asymmetric European headlights, however, the driver with the former headlights is hardly in a less favourable situation than when meeting an oncoming car also equipped with normal symmetrical European headlights, since the luminous intensities in directions above the horizontal plane in the left half of the asymmetric European beam has only been increased very slightly.

Conclusion

The results of the experiments show that the asymmetric European passing beam described produces a visibility which for objects along the right-hand verge of the road is at least equivalent to, and for objects in the middle of the road or along the left-hand verge is appreciably more favourable than, that produced by the new sealed beam lamps. A comparison of the light distribution curves between the two sorts of headlights shows that the asymmetric European headlight causes, on a straight road, less than one-half of the glare produced by the new sealed beam lamps. In a transitional period, during which symmetrical and asymmetrical passing beams would occur on the same road, the asymmetrical European passing beam can therefore better be "endured" by drivers using the symmetrical European passing beams than a passing beam of the Anglo-American type. The asymmetrical European headlight shows a distinct cut-off in the left half of the passing beam and herewith a practical aid in the correct aiming of the headlight.

Lighting Abstracts

LAMPS AND FITTINGS

135. Fusing of ballasts for fluorescent lamps. 621.329

E. C. SCHORR, *Illum. Engng.*, **49**, 495-496 (*Oct.*, 1954).

Describes how excessive heating of fluorescent lamp ballasts can cause failures, particularly in lead-lag circuits, by damage to the winding insulation or capacitor. Various remedies for overheating are given. The use of a fuse in series with the ballast is advocated as an additional precaution. Ratings are given for fuses to be used with a number of different types of lamp. P. P.

136. Most economical life for electric lamps. 621.32

F. ZIEGLER, *Lichttechnik*, **6**, 395-398 (*Nov.*, 1954). *In German.*

This paper is a guide to the most economical system of lamp replacement, taking into account the various factors involved, *viz.*, the cost of the lamp (the treatment is not confined to filament lamps), the cost of individual replacement, the cost per lamp of group replacement and the probable life of a lamp. The formulae derived by calculation are presented as graphs, by means of which it is possible to determine (a) which system is cheaper and (b) in the case of group replacement the most economical interval. Practical examples of the use of the data are given for systems of 100-watt filament lamps, 40-watt fluorescent lamps and 80-watt lamp H.P.M.V. lamps. J. W. T. W.

535.61

137. Ultra-violet radiation, fluorescent materials, fluorescent paints and their uses.

E. JACOB, *Lichttechnik*, **6**, 391-394 (*Nov.*, 1954). *In German.*

The most important sources of u.v. radiation are the low-pressure mercury vapour lamp and the high-pressure m.v. lamp, which have maxima at 253.7 and 366 nm. respectively. There are a large number of fluorescent materials which emit visible light when irradiated by the short-wave u.v., and these are used in fluorescent lamps. There are also materials, both organic and inorganic, which glow under the longer-wave u.v., and some in both groups show phosphorescence, emission which persists after the irradiation has ceased. A number of materials, chiefly those in the second group, are used in the form of paints for creating striking displays when irradiated by long-wave u.v. from so-called "black lamps." Several interesting examples are illustrated. J. W. T. W.

138. Characteristics of fused quartz. 621.329

C. E. WEITZ, *Illum. Engng.*, **49**, 513-519 (*Nov.*, 1954).

Processing of quartz from raw materials described and some of its optical, thermal, electrical and mechanical properties listed. The use of quartz in the construction of arc tubes for mercury lamps and of tungsten filament infra-red heat lamps is discussed. P. P.

621.327.4

139. Xenon short arc lamps and their application.

W. E. THOURET AND G. W. GERUNG, *Illum. Engng.*, **49**, 520-526 (*Nov.*, 1954).

Briefly reviews the development of rare gas arc lamps to meet the need for a light source combining the high luminance of carbon arcs with the maintenance-free operation of filament lamps. Four new xenon short arc lamps (150, 500, 1,000 and 2,000 watts) are introduced and particulars of their operating characteristics given. Efficiencies of 16-22 lm/watt are obtained with arc lengths of 2-4 mm. high-voltage pulse circuit required for starting, lamp giving 80 per cent. of peak luminous output at moment of switching. P. P.

140. Determinants of fluorescent lamp life. 621.327.43

R. N. THAYER, *Illum. Engng.*, **49**, 527-535 (*Nov.*, 1954).

Fluorescent lamp life determined essentially by emission from cathode coating. Methods for prolonging this emission are described, including the use of triple-coil cathodes and an inert gas filling. Details of life test procedure are given and the effect on lamp life of supply voltage, lamp current waveshape, ambient temperature, frequency of switching and other factors are discussed. Instant-starting (starting without pre-heat of cathodes) of lamps not designed to be operated in this way is found to be one of the commoner causes of shortened lamp life. P. P.

141. Control of electrical lighting with dimmers. 621.329

W. P. CARPENTER, *Illum. Engng.*, **49**, 540-544 (*Nov.*, 1954).

The relative advantages and disadvantages of dimming electric lighting by means of resistances, movable and saturable core reactors, thyratrons and continuously variable autotransformers are discussed. The resistance type dimmer is the only one which operates on both A.C. and D.C. The continuously adjustable autotransformer has a number of advantages which have given it wide use in theatre lighting. A 360-watt version fitted into a wall box is described. P. P.

621.327.43

142. Some problems involved in the design of fluorescent lamps.

E. F. LOWRY, W. C. GUNGLE AND C. W. JEROME, *Illum. Engng.*, **49**, 545-552 (*Nov.*, 1954).

Data on the operating characteristics of fluorescent lamps have been re-evaluated as a result of recent developments in lamp design. Maximum efficiency given with a tube diameter of 1½ in. and an ambient temperature of 60 deg. F. Efficiency also improved by decreasing pressure of inert gas filling and by using krypton or argon: krypton instead of argon. Slight decrease in lumen maintenance produced with lower gas-filling pressures. P. P.

143. Classification of luminaires by distribution 628.93

I.E.S. Committee on Illumination Performance Recommendations, *Illum. Engng.*, **49**, 552-553 (*Nov.*, 1954).

Instructions are given for plotting the photometric curve of a luminaire under consideration on a newly presented chart and then obtaining from this chart the distribution classification of the luminaire and the corresponding spacing-to-mounting height ratio in order to produce illumination of suitable uniformity between adjacent luminaires. P. P.

LIGHTING

628.972

144. Choosing the colour of the lighting for workrooms and for correcting colours in picture production.

W. BARTHOLOMEYCZYK, *Lichttechnik*, **6,** 323-325 (*Sept.*, 1954). *In German.*

For the general illumination of a colour printing works white or de luxe white lamps should be used. For the critical examination of colour prints a high local illumination of 100 lm/ft² is required and this can be conveniently provided in a cabin lighted from the top by a group of fluorescent lamps, three daylight, two de luxe white and one blue. The proportions in the mixture illuminating the print can be varied at will by the examiner. The author gives a kind of block diagram for each of 13 different types of illuminant. For certain purposes the xenon lamp with a suitable filter is recommended. When work is being done on a print in a certain colour, there is sometimes an advantage in using an illuminant of roughly complementary hue. J. W. T. W.

628.971.6

145. Fluorescent lighting of the Saint-More Tunnel on Route Nationale No. 6.

R. LAME, M. DUBOST and L. DUBOST, *Revue Gen. de l'Electricite*, **63,** 581-586 (*Oct.*, 1954). *In French.*

The Saint-More Tunnel is a straight tunnel 230 metres long under a hill, carrying heavy traffic. The original lighting was entirely inadequate, and has been replaced by a new installation using 40-watt hot cathode fluorescent lamps. The lamps are used without louvres in two rows at the haunches of the tunnel, and arranged to give three lighting zones: one at each mouth of the tunnel, one intermediate zone adjacent the mouths and one central zone. Four lighting levels are provided, for bright daylight, dull daylight, normal night and reduced night lighting respectively.

The lighting fittings project from the tunnel wall, with the lamps in groups of up to four. The lamps are balanced on all three phases; they have glass sleeves over the central part to maintain light output in cold weather. The three lower lighting levels are controlled by time switches and the highest by photo-electric control; illuminations are graded from 250 lux at the entrance to 30 lux at the centre in bright daylight. In dull weather the entrances are diminished to 150 lux; by night the level is uniformly 30 lux (full) and 15 lux (reduced lighting). There is only one source of supply and no standby. J. M. W.

146. Light and colour engineering in post offices. 628.972

T. C. CARGILL, JUN., AND C. E. KAUTT, *Illum. Engng.*, **49,** 477-481 (*Oct.*, 1954).

Gives details of the experimental lighting installations, on the results of which has been based a programme for improving the working environment of United States post office buildings. Fluorescent luminaires giving 35-45 lm/ft² with a 35-deg. cut-off and some upward component were found to produce the design requirements of well-distributed glare-free lighting. Colours of high reflection factor were chosen for the decoration schemes. P. P.

628-972

147. An analysis of 12 solutions to a home-lighting problem.

L. SCHMECKEBIER, G. DANFORTH AND K. STALEY, *Illum. Engng.*, **49,** 487-492 (*Oct.*, 1954).

Reports an analysis of the solutions submitted by 12 teams of architect/engineer/designers in a student competition for the best lighting scheme for a house. The analysis revealed extensive use of 11 principal methods of lighting (*viz.*, portable luminaires, recessed downlights, etc.), one solution employing all 11 methods together. Constructional details are given of 10 of the luminaires designed by the teams. P. P.

612.843.367

148. A practical investigation on discomfort glare.

J. C. LOWSON, A. DRESLER AND S. HOLMAN, *Illum. Engng.*, **49,** 497-500 (*Oct.*, 1954).

In order to derive a "comfort scale," calibrated in terms of the Harrison-Meaker glare factors, which would be acceptable to the Australian lighting profession, a representative number of Australian lighting engineers used the scale to make appraisals of the glare from 12 lighting installations. The scale was found to correlate well with the glare factors and confirmed the usefulness of the glare factor concept. The Australian observers interpreted the glare factors as corresponding to somewhat less glaring conditions than did the original Harrison-Meaker calibration. P. P.

628.971

149. (1) Technical progress in illumination of monuments; (2) Illumination in graduated colour at Monaco.

M. G. LEBLANC, *Lux*, **22,** 98-101; 102-3 (*Nov.*, 1954). *In French.*

(1) A dissertation on controlled floodlighting in colour, with reference to control systems, particularly the "Chromon" (an arrangement of resistances controlled by a single lever which can be moved within a window, controlling three series of projectors in three colours in such a way as to control the resultant colour in a scheme analogous to the colour triangle). The "Chromon" permits the control of colour independently of intensity, and the repetition of a previous setting simply and exactly. (2) A description of the lighting of the Church of Sainte-Dévote, Monaco, and of the surrounding ravine, and of the Rock of Monaco. Both are in colour, the latter by Infranor projectors dimmed by auto-transformers, which are controlled from a distant "Chromon" controller using telephone cables leased from the Municipality. J. M. W.

628.97

150. The artificial lighting of sports areas in Sweden.

P. HELLMAN AND A. LINDGREN, *Ljuskultur*, **26,** 81-87 (*Oct.-Dec.*, 1954). *In Swedish.*

Sports buildings have been divided into four main categories from the big stadiums to small training grounds. Illumination levels for different sports have been specified for each category of sports place. Suitable light sources and types of directional equipment are discussed, and the lighting of ice hockey rinks is given special attention. Leading games players with experience in many countries expressed the view that judgment of distance is often faulty in artificial light, a football, for example, appearing nearer than it actually is. R. G. H.

151. How is fluorescent street lighting faring? 628.971.6

B. SUNDSTROM, *Ljuskultur*, **26,** 93-96 (*Oct.-Dec.*, 1954). *In Swedish.*

An enquiry reveals that experience with fluorescent street lighting in Sweden is encouraging in spite of the special temperature problems. Recent American developments in lamps with their best performance at very low temperatures of the ambient air are being followed with interest. Mention is made of an installation of 100 lamps which has operated for 7,600 hours without the need for any lamp replacement. R. G. H.

A Conference on Vehicle and Road Lighting

The Automobile Division of the Institution of Mechanical Engineers arranged, on January 11 last, a whole-day symposium on vehicle and road lighting at which four papers on these closely allied subjects were read and discussed.

The meetings, which were very well attended, were held in the Institution theatre and in the morning the chair was taken by Mr. J. H. Pitchford, the Chairman of the Automobile Division. Two papers were read and each was followed by a lively discussion. The first, entitled "Rear Lights and Reflectors," was by Dr. K. N. Chandler, of the Road Research Laboratory, Mr. K. J. Jones, of Joseph Lucas, Ltd., and Mr. J. A. Reid, also of the R.R.L.

A lengthy summary of the paper was given by Mr. Jones, who began by stating the experimental basis for the luminous intensity required in a rear light. It had been found, he said, that with 5,000 candelas glare at the same distance as, and 6 ft. to one side of, a rear light with an intensity of 0.075 cd, the latter was "just unmistakable" as such at about 350 ft., and one of 0.5 cd was "just obvious" at about 500 ft. Observations of road situations showed that, after making some allowances for manufacturing tolerances, a rear light should aim to provide 0.5 cd (with a minimum of 0.075 cd) in all directions within 15 deg. horizontally and 9 deg. vertically of the axis of the vehicle. The B.S.I., said Mr. Jones, had recently published a standard for tail lights, giving three levels of intensity, one "to be achieved whenever possible," one "to be regarded as the minimum requirement" and the third for cycles. The first two corresponded roughly to the figures he had quoted.

The authors stated in their paper that a further purpose of a rear light was to enable a driver to estimate its distance and with two lights at least 2 ft. apart this could be done fairly reliably.

Dr. Chandler then explained the way in which a reflector based on the principle of the "corner-cube," or tetrahedron, reflected light back on its original path and this explanation was illustrated with a number of ingenious demonstrations. Here again the authors gave in their paper the requirements for satisfactory performance and referred to the recently issued British Standard for Reflectors.

A number of speakers took part in the discussion, which was opened by Mr. Woodbridge of the B.S.I. with a plea for greater uniformity and a reminder that a British Standard was not fixed for all time but could be modified as practice improved. Other points mentioned were the wide diversity of angles at which reflectors were fixed to vehicles and the greater effect of mist on a reflector than on a tail light as regards reduction of the intensity.

Several speakers referred to the confusion caused by the many lights with different uses and meanings often fixed to the rear of a car. This subject was introduced by Mr. T. B. Rolls, who urged that a tail light should not be made to do other duties as well. The glare from tail lights of too great an intensity was also mentioned.

Street Lighting

The second paper, by H. R. Ruff and G. K. Lambert, was entitled "Street Lighting Performance" and gave an excellent account of the principles underlying the design of a street lighting system and the factors affecting revealing power on the street. After summarising the requirements of the Code for Traffic Route Lighting, the authors demonstrated, by means of a series of "true representation" slides, the importance of silhouette vision. They pointed out that by street lighting alone objects were usually seen by true silhouette (dark on light) whereas with headlights alone they showed up by reversed silhouette (light on dark). In one slide, showing the effect of using both street lighting and headlights, it could be clearly seen that with such an arrangement an object might well disappear altogether.

Turning to the effect of road surface characteristics, Mr. Ruff used a model to demonstrate the way in which the size and shape of the bright patch on a road was affected by the nature of the surface. He showed the appearance of the patch created by (a) a uniform light distribution, (b) a cut-off and (c) a medium-angle beam fitting on white and on black surfaces, polished, matt and rough.

Next came the showing of a film devised to help the lighting engineer of a local authority to explain the principles of the Code to his Committee, while in conclusion the colour rendering effects of the different light sources commonly used in street lighting were demonstrated.

The discussion was opened by Dr. Gillbe, who struck a new note by expressing the opinion that it was possible to overdo the modern craze for uniformity in street lighting. He emphasised that the siting of the light sources was of the greatest importance and said that the spacing was an average figure which should be varied, within reason, to give good siting. The authors had mentioned central mounting for the lighting of dual carriageways, but he felt that this would not be satisfactory if the carriageways were at all wide.

Mr. J. M. Waldram said that the purpose of the street lighting was to give the driver all the information he needed, unambiguously and as early as possible. Referring to the demonstrations, he deplored the fact that so often the advantages of a good street lighting system were completely nullified by the road surface.

There was a discussion between several speakers as to the desirability of driving with dipped headlights on, even in urban areas with good street lighting. Dr. E. A. Watson strongly advocated it, but other speakers pointed out that the practice might well cause a considerable amount of glare, especially in wet weather when reflections could be very trying.

Headlights

In the afternoon, under the chairmanship of Dr. E. A. Watson, Director of Research for Joseph Lucas, Ltd., the programme was arranged somewhat differently. There were two papers on headlights—one by Dr. J. H. Nelson on the "Design and Use of Headlight Meeting Beams," and the other by Mr. G. Grime, of the Road Research Laboratory, on "The Performance of Headlamp Meeting Beams." These papers were first read by their respective authors and then discussed together.

Dr. Nelson emphasised at the outset that his paper was concerned solely with the "meeting" beam, sometimes called the "passing" beam or the "city" beam, intended

for use when meeting other vehicles and not for driving on the open road clear of opposing traffic. He said that there were two schools of thought as to the desirable form of beam for this purpose, one the European (Continental) school, and the other the Anglo-American school. The shielded filament lamp, originally designed by Graves in England, gave the hard horizontal cut-off which on the Continent was considered essential to road safety. Anglo-American designers, on the other hand, took the view that because the problem was a dynamic one and because roads had both vertical and horizontal curves, drivers would meet such a variety of conditions that anything of the nature of a hard cut-off could not give the best visibility.

Dr. Nelson described the initial results of a study of the way in which vehicles did meet on the road and said that the information resulting from this survey could be used to guide the design of the meeting beam. He then went on to discuss the problem of lamp setting, and he showed some of the equipment available for adjusting the aim of a headlamp beam. The standard of aiming, he said, was higher in America than in this country, and he described the steps taken in various States to achieve this; in some States inspection to ensure, among other things, correct aiming of the headlamps was compulsory, in others it was voluntary.

Finally, Dr. Nelson referred to the practice in the new world of driving on headlamp meeting beams at all times after lighting-up time, in contrast with the old world practice of driving without headlamps whenever possible. He claimed that the latter practice was dangerous, and gave it as his opinion that many of the fatal accidents in suburban streets were solely due to the European practice, largely followed in Great Britain, of driving without headlamps.

Mr. Grime started on a pessimistic note by saying that the state of vehicle headlighting on the road to-day left much to be desired. Lamps were of many different designs; a high proportion were badly aimed and many had seriously deteriorated. Dazzle and poor visibility were common when vehicles met, but although dazzle was more complained of by drivers, poor visibility was probably more important as far as safety was concerned. His paper gave an account of work done recently at the Road Research Laboratory on this important question of how to improve visibility when vehicles were meeting.

Two surveys, said Mr. Grime, had been made to determine the amount of dazzle on British roads. The first was based on the opinions of observers, mainly police drivers, travelling in cars with properly adjusted meeting beams; the second was made with a photo-electric measuring device. The conclusions reached were that (a) about one-seventh of the vehicles met carried dazzling lamps, (b) most of the dazzle was due to badly adjusted meeting beams, since only about one in 20 of the drivers refused to dip, (c) pass lamps were twice as likely to cause dazzle as dipped headlamps, and (d) public service vehicles were the worst offenders, commercial vehicles next, while cars and vans were best.

The aiming of the lamps on British roads was so poor, said Mr. Grime, and the deterioration of light output so marked, that a very large improvement would certainly result if all meeting beams could be brought to a similar state of efficiency and correct aim. This, in his opinion, was the most effective single step that could be taken to increase visibility and reduce dazzle.

In addition to the surveys, experimental work was carried out at the R.R.L. to determine the distance at which a driver could just pick up a test object when a second car, fitted with headlamps exactly similar to those he was using, was placed near the test object but on the other side of the road. From the results of these experiments it had been possible to produce curves which enabled the performance of a meeting beam to be determined when its light output in different directions was known.

The discussion on these papers was opened by Major J. R. Kinsey, Chief Engineer of the Automobile Association, who said that dazzle on the roads was as bad to-day and as great a menace, as it had ever been. At the same time it was possible to exaggerate its importance and the experienced driver acquired a certain degree of immunity. He expressed a strong liking for the dip-and-switch system, rather than double dipping, and said that he liked the flat-topped beam. He roundly condemned the foot-operated switch. His statement that yellow light was preferred by many drivers, who felt that it reduced the dazzle effect, led to remarks from a number of subsequent speakers, some for and some against the use of yellow beams.

Mr. Woodbridge advocated standardisation as the best means of achieving the uniformity which had been urged by Mr. Grime. He was emphatic in condemning the use of a third lamp mounted in the radiator or on the bumper.

In his reply to the discussion, Dr. Nelson said that as a result of extensive trials it had been found that drivers preferred the double dip to the dip-and-switch, and Mr. Grime described some experiments with yellow light. While these had given somewhat inconclusive results, he said that there could be no doubt whatever that the use of yellow light would not solve the dazzle problem.

Road courtesy was another matter debated at some length, and it was stated that, while the standard of courtesy by day was higher in this country than elsewhere, at night it underwent a severe deterioration.

At the end of the meeting a résumé of the main points made during the day, both in the papers and in the discussions which followed them, was given by Mr. Grime and the symposium then concluded with a vote of thanks to the authors. The papers will appear in full, with an account of the discussion, in the Proceedings of the Institution of Mechanical Engineers.

1955 Electrical Power Convention

"Electricity and the Future" will be the theme of the seventh British Electrical Power Convention which is to be held at Brighton from June 27 to July 1, 1955, under the presidency of Sir Harry Railing, chairman and joint managing director, General Electric Co., Ltd. An exhibition will be held in the Sports Stadium, West-street, Brighton.

A ten-year forecast on "The Generation of Electricity in Britain" will be given on Wednesday, June 29, by Mr. J. Eccles, deputy chairman (Operations) Central Electricity Authority (as the B.E.A. is now called). "The Electrical Industry as a Career" is the subject of three papers on Wednesday afternoon. Sir Henry Self, deputy chairman (Administration), Central Electricity Authority, will deal with that industry's aspect of the subject; Mr. S. E. Goodall, vice-president of the I.E.E. and Chief Engineer of W. T. Henley's Telegraph Works Co., Ltd., will deal with "The Manufacturing Industry," and Mr. R. A. Marryat, vice-president of the E.C.A., will speak on "The Installation Contracting Industry." "Electricity and the Industrial Future" is the subject for discussion on Thursday, June 30. There will be four papers, the first of which, "The Use of Electricity in the Steel Industry," will be by a spokesman of that industry. Mr. B. L. Metcalf, Chief Electrical and Mechanical Engineer of the National Coal Board, will speak on "The Use of Electricity in the Coal Industry." In the afternoon, "The Use of Electricity in the Chemical Industry" will be dealt with by Mr. G. Nonhebel, Fuel Technologist and Head of the Fuel Economy Section of Imperial Chemical Industries, Ltd. A paper on "The Use of Electricity in the Catering Industry" will be presented by Mr. Felix A. Rogers.

The Convention dinner and dance at the Corn Exchange will complete Thursday's proceedings. On Friday, July 1, two hours will be given to the popular "Electrical Forum."

New Products

Shallow Trunking

Trunking systems of any type normally show substantial savings due to lower labour costs, fewer suspension points and the elimination of multiple conduit runs. The new shallow lighting trunking now available from Ediswan gives additional valuable savings because it is designed for use with standard conduit accessories and suits standard lighting fittings. The cost of the trunking is only 40s. per 13 ft. length with accessories extra as required. This shallow form of trunking makes it suitable for use in offices and stores as well as in factories; yet, because the whole of the interior of the trunking is available for cable, there is ample space for all wiring connected with the lighting circuits and for separate circuits supplying light duty power operated equipment which may be mounted on the trunking or fed from socket outlets placed at any desired position on the trunking run.

The trunking is robust, easy to handle and to install. It consists of 4½ in. wide by 1½ in. deep 18 s.w.g. " Bonderised " and enamelled steel channel in 13 ft. lengths. These are coupled together by junction pieces to form a continuous run along which any standard type of lighting fittings (tungsten, fluorescent or mercury discharge) can be positioned as required. The trunking is also available in extruded aluminium (0.1 in.). A distinctive feature of the trunking is the carrier plate used for the support of lighting fittings. It may be placed in any desired position and the tightening of two screws anchors it securely and ensures continuity of earthing (essential for instant start circuits). The carrier plate provides female entry for ¾ in. conduit outlets or extensions or for standard suspension hooks. A reamed nipple with three lock nuts converts the entry to male for mounting fittings to the surface of the trunking. Since these components are standard conduit parts standard fittings of any type can be used. To change the arrangement of fittings it is only necessary to slacken off the carrier plate and re-position and this operation is further facilitated by the use of specially designed four-way two-pole connector blocks.

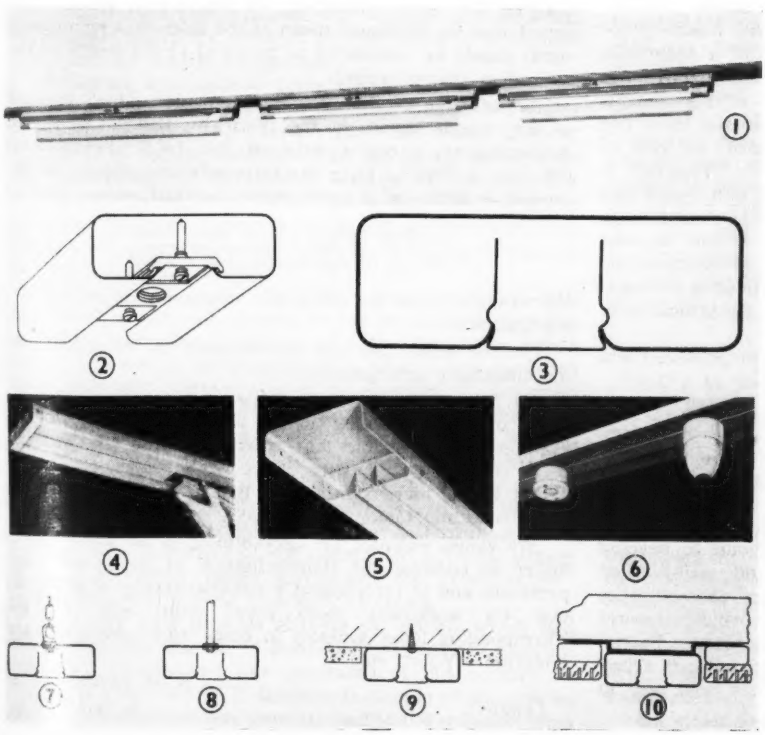
The insertion of the snap-in cover strip which is used to seal the trunking between fittings divides the trunking into three separate ducts, the two large outer ducts taking principal circuits and the middle, the inter-connections between fittings. End-caps which terminate runs of trunking have three knock-outs to clear ¾ in. conduit or 1 in. conduit by reaming the apertures. A unique feature of the trunking is the space available for handling wiring after the original installation has been completed. The withdrawal of the cover strip removes the interior walls which separate the three ducts, giving ample space for manipulation.

Ediswan trunking is suitable for all normal methods of suspension by chain or conduit, considerably fewer structural suspension points being required than for an equal number of fittings suspended individually. The shallow form of the trunking makes it particularly suitable for recessing in plaster or in acoustic tile ceilings. In buildings under construction the trunking can be mounted before concrete is poured to create concealed cable runs, with a flush surface.

Capless Flashbulbs

The B.T.H. Co., the G.E.C. and Philips Electrical are now marketing a new inexpensive capless flashbulb. It is suitable for both professional and amateur use. Peak time for the new bulb is approximately 18 milliseconds after contact and flash duration is 10 milliseconds; total light output is 6,500 lumen seconds, i.e., more than the previously smallest bulb. The price of the new bulb is 8d.

A special adaptor is available by which the new flash-



Ediswan shallow trunking—

(1) With standard type fluorescent fitttings.

(2) Perspective view showing carrier plate to which fittings are attached.

(3) Section of trunking. (Half scale.)

(4) Cover strips being placed in position.

(5) Showing the three cable ducts.

(6) With a switch and a B.E.S.A. box with socket outlet.

(7) Standard form of suspension, using hook and chain.

(8) Standard form of suspension using conduit.

(9) Mounted direct on, or recessed into, ceiling.

(10) Recessed into acoustic type ceiling.

bulb may be used with any flashgun made to take normal A.S.C.C. flashbulbs.

Plaster Depth Switches

The General Electric Co., Ltd., has produced a new range of "Mutac" 5-amp. A.C. flush switches which are available in either cream or brown and arranged in one-gang and two-gang assemblies for mounting on a new range of pressed-steel plaster depth boxes.

The one-gang assembly consists of a one-way or two-way switch riveted to a Bakelite plate measuring 3¼ in. square. The two-gang unit has two switches, either one-way, two-way or a combination of these, riveted to a 5⅛ in. × 3¼ in. plate. The plates are specially shaped to absorb part of the depth of the switches, and this makes them suitable for fitting to ⅝-in. deep plaster depth boxes. The fixing holes in the plates, two holes for one-gang and four for two-gang, are at 2⅜-in. centres for direct fixing to plaster depth boxes or to the deeper patterns such as those to the dimensions given in BS 1299 and BS 1363. Captive 4 BA fixing screws, bronze colour for brown units and chromium-plated for cream units, are provided to allow adjustment for varying thicknesses of plaster.

Photoelectric Daylight Monitoring Unit

A new G.E.C. photoelectric daylight monitoring unit provides automatic control of electric lighting in factories, offices, schools, shops, docks, railway stations and sidings, airports, electric signs and similar situations.

The equipment requires very little maintenance, and is extremely simple in operation. It measures continuously the amount of daylight present and when this falls below a preset limit, the unit automatically switches on the artificial illumination. The advantage of this system of control is that it is dependent solely on the prevailing lighting conditions. In some instances a clock control mechanism can be used advantageously in conjunction with the photoelectric monitor, as, for example, where lights have to be switched off at a specific hour before dawn.

The unit is housed in a cast aluminium weatherproof case, all the components being mounted on a sheet-steel chassis so that they are easily accessible for maintenance purposes. The self-contained single-pole switching contacts have a maximum loading of 900 VA, but heavier loads can be controlled by using an external contactor, the coil of which is excited from the photocell relay. The unit is equipped with a remote sensitivity control unit which can be situated up to 300 ft. away and enables the sensitivity to be varied so that the relay will operate at the required degree of daylight. The switching range is continuously variable between 0.4 and 3 lm/ft² and the circuit is arranged so that relay "chatter" does not occur at the critical dusk and dawn periods.

The unit, which incorporates an antimony photocell and an Osram L63 triode valve, has a list price of £32.

Ballast for Sodium Lamps

A new type of ballast, designed to meet the particular requirements of sodium lamp street lighting installations, is now being marketed by Philips Electrical Ltd. The space limitations imposed by street lighting column base cavity size have, hitherto, made it extremely difficult to develop a unit combining compact dimensions and well-finished appearance whilst maintaining good electrical characteristics throughout a long life. In the new ballast—which measures 8⅛ x 4⅛ x 4½ in.—this problem has been overcome. Special features are a marked resistance to corrosion and easy accessibility of terminals. Particular attention has been paid to moisture-proofing.

Correspondence

Room Index

To the Editor, LIGHT AND LIGHTING

Sir,—We are writing to draw attention to the need for an authoritative definition of the concept "Room Index," as some confusion has been created in the minds of laymen by the fact that rooms having identical dimensions have been denoted by different room indices by different authors.

Room indices were originally introduced because the classical experiments of Harrison and Anderson were carried out in square rooms. In order to assess the effect of the dimensions of a rectangular room on the utilisation factor of a given fitting, it is convenient to state the proportions (e.g., width/height) of the square room which would be, for this purpose, equivalent to the given rectangular room.

In the past, the room index has been frequently expressed as follows:—

For direct, semi-direct and general diffusing luminaires

$$\text{Room index} = \frac{\text{Width of equivalent square room}}{2 \times \text{Mounting height above working plane}}$$

For semi-indirect and indirect luminaires

$$\text{Room index} = \frac{3 \times \text{Width of equivalent square room}}{4 \times \text{Ceiling height above working plane}}$$

We wish to suggest that the above expressions should be generally adopted. Individuals will still be free to use whichever expression they may choose for determining the width of the equivalent square room, until such time as general agreement is reached in favour of one of the many formulae currently employed. (In this connection it is encouraging to note that more and more authors have adopted the recommendation of Dourgnon, Hisano and others that the harmonic mean of the sides of a rectangular room should be considered to be equal to the width of the equivalent square room.)

An example of the avoidable confusion which prevails in this matter occurs in the paper by Bellchambers and Ackerman in a recent issue of the I.E.S. Transactions (**20,** No. 2, 1955). Here the inter-reflection ratios are expressed in terms of a room index specified as:—

$$\frac{\text{Ceiling height above floor level}}{\text{Width of equivalent square room}}$$

We would criticise the use of this expression on the following grounds:—

(1) The numerator and denominator are reversed from the customary arrangement.

(2) The ceiling height is measured from floor level instead of from working plane, although in the worked example it is probable that reflections from the working plane (i.e., desk-tops, with 50 per cent. reflection factor) would be of more significance than reflections from the floor (reflection factor 10 per cent.).

We would welcome the appointment of an *ad-hoc* committee to consider the standardisation of room index expressions, and to recommend a uniform system of presentation for numerical room index data, and for the corresponding letter symbols in cases where the latter are preferred.—Yours, etc.,

R. A. HOUNSLOW.
J. A. LYNES.

London.

I.E.S. Activities

ANNUAL DINNER

The Society annual dinner and dance will be held at the Café Royal, Regent Street, W.1, on Wednesday, April 20. Tickets (35s. each) may be obtained from the I.E.S. Secretary, 32, Victoria Street, London, S.W.1.

PEEBLES MEETING

A week-end meeting arranged by the Edinburgh, Glasgow and Newcastle Centres will be held at the Peebles Hydro on May 6, 7 and 8. Papers will be given by J. M. Waldram and Jean Chappat. Full details of the meeting can be obtained from R. J. Fothergill, Northgate House, St. Mary's Place, Newcastle-upon-Tyne, 1.

London

In a lecture entitled "Fading and related effects associated with the radiation from light sources," which was given to a meeting of the I.E.S. in London at the Royal Society of Arts on January 11, 1955, Mr. B. S. Cooper pointed out that the action of light on a coloured material could produce fading and loss of strength (tendering). These phenomena could occur either independently or together. The essential factor was that the radiation had to be absorbed in order to produce a photo-chemical action, and this absorption could result in heating of the material, a re-emission of the radiation at a different wave-length (fluorescence) or the production of a chemical reaction resulting in fading or disintegration. One important reaction was that of photo-oxidation of dyed textile materials which, in the presence of moisture, could result in the production of hydrogen peroxide which would both reduce the strength of the material and bleach the dye. Slides and demonstrations showed in an effective manner the fading, tendering and discoloration which could be produced by prolonged exposure to light and explained why window curtains could disintegrate where the coloured pattern produced a localised absorption of the sun's radiation.

Reference was made to complaints of fading which had been attributed to the type of illuminant used but where closer investigation had shown that the textile material itself was of inferior quality. This led to a discussion on the development of satisfactory sources of radiation for accelerated fading tests. The carbon arc was frequently used but has been criticised for having a disproportionate amount of long-wave-length ultra-violet radiation relative to that in natural sunlight.

A considerable part of the lecture was devoted to fading in relation to museum lighting, and in particular to a report prepared by Professor Genard of Liege University, which caused concern in the museum world when it was published three years ago. Genard studied the emission of ultra-violet radiation from fluorescent lamps using a spectrographic technique and was able to detect spectral lines at 3,022, 2,967 and 2,894 deg. A. He assumed that these lines must be markedly photo-chemically active since they were adjacent to a zone of radiation having a strong deleterious action. Without ascertaining the radiant power emitted at each of these wave-lengths, Genard warned of the consequent potential danger of using fluorescent lamps, particularly the "warm-white" type, where there was the possibility of fading.

As a first step towards allaying the doubts which had arisen regarding the use of fluorescent lighting for museum exhibits, a simple test was conducted in this country by F. I. G. Rawlins and W. E. Rawson-Bottom in which samples of relatively fugitive dyes were exposed to the radiation from a "warm-white" lamp. Three conditions of exposure were studied, *viz.*, direct radiation, radiation through ordinary window glass and radiation through a glass filter opaque to all radiations of wave-length shorter than 3,700 deg. A. The rate of fading of all the samples was found to be the same throughout the test, which appeared to invalidate the contention that the spectral lines which had been detected in fluorescent lamp radiation, and which were removed by the glass filter, would accelerate fading.

This simple test was followed up by more detailed studies conducted by the author and his colleagues. One such study was of the energy content of the radiation from a number of fluorescent lamps. Here it was found that at 100 cm. from the centre of a 40-watt "warm-white" lamp, where the total intensity of the visible and ultra-violet radiation (2,900-7,500 deg. A) was 75 microwatts/cm^2, the combined intensity of the spectral lines at 2,967 and 3,022 deg. A was 0.009 microwatts/cm^2, while the intensity of the line at 2,894 deg. A was too weak to be measured. This order of values, that is, a few parts in 10,000, was confirmed for 12 lamps of different make, colour and country of origin.

Another test was of the deterioration of dyed samples under monochromatic radiation using a special quartz 400-watt H.P.M.V. lamp in conjunction with a series of filters. This enabled spectral lines in the visible and ultra-violet to be obtained at a common intensity on the sample of 200 microwatts/cm^2, that is, at more than double the intensity of the combined visible and ultra-violet radiation from an ordinary 40-watt fluorescent lamp. Tests which have so far been made with this lamp show that the shorter wave-length ultra-violet radiation, even with equal intensity of irradiation, is not necessarily the most potent in producing fading of dyed materials.

The lecture concluded with a description of a somewhat different approach to the subject of fading which has been made by American workers. This approach was prompted originally by the problem of relighting the Metropolitan Museum of Art, New York, and was stimulated by Genard's report. The approach uses a series of Probable Relative Damage factors, dependent on the wave-length of the radiation and based on measurements of the photo-chemical deterioration of low-grade paper. These factors are used in conjunction with the known spectral distribution of the illuminant under consideration and the C.I.E. standard luminosity data to obtain a figure for the Probable Rate of Damage per unit of illumination. The technique has been applied to estimate the radiation hazard likely to be experienced in a museum gallery lighted by daylight (sun and sky light) and by fluorescent and incandescent lighting, and an estimate has been obtained of the duration of exposure to each type of illuminant before appreciable damage will be caused.

Leicester Centre

The Leicester Centre of the Illuminating Engineering Society were privileged on February 28 to have a visit from Dr. J. W. Strange, a vice-president of the Society.

The subject of Dr. Strange's talk was "Lighting Maintenance Problems," in which he dealt with the many problems which confront works engineers in their task of maintaining good and efficient lighting installations. He mentioned that many good lighting schemes had deteriorated to an alarming extent through lack of planned cleaning and relamping programmes.

Dr. Strange gave illustrations and facts to prove that bulk replacement of lamps in large installations not only maintained a high standard of lighting, but proved to be sound economic practice.

On street lighting he said he considered heavy expense

could be involved by replacing odd lamps that had failed and suggested it much more satisfactory to replace entire stretches of road after lamps had had a predetermined life. By this means labour costs could be spread over, and more efficient lighting would result.

Dr. Strange's subject was a provocative one, and the discussion that followed brought out many interesting points.

Birmingham Centre

The Birmingham Centre held its annual general meeting on Friday, March 25, 1955. The annual report of the committee was presented, and the election of officers and members of the committee confirmed. After the formalities Mr. J. G. Holmes, B.Sc., A.R.C.S., F.I.E.S., was called upon to give his paper, entitled "Terms and Techniques for Satisfactory Lighting." He dealt with all the units with which the lighting engineer is familiar and some new ones which are likely to become better known in the not too distant future. Leaving mere terms, Mr. Holmes spoke of quality of light as against quantity only. It was absolutely essential that the lighting engineer and the architect worked in complete harmony. One without the other could not do a complete scheme properly. An architect on his own could not build a house, and a lighting engineer could not light a room. Mr. Holmes dealt briefly with specialised types of lighting for appropriate buildings, in particular with church lighting. Summing up, Mr. Holmes stressed the point that comfortable visual conditions should be the aim of every lighting engineer.

Swansea Group

The third annual dinner and dance of the Swansea Group was held on February 4 at the Pier Hotel, Swansea. The guests included Mr. H. G. Campbell, vice-president, and Mrs. Campbell, Councillor D. C. Concannon (deputising for the Mayor of Swansea), Mr. G. R. T. Edwards, manager of the West Central Sub-Area of the South Wales Electricity Board, Mr. W. A. Cooper, chairman of the Cardiff Centre, and Mrs. Cooper, and Mr. G. R. Hanson of the Birmingham Centre.

The toast to the Society was proposed by Cllr. Concannon, to which Mr. Campbell replied. "The Guests" was proposed by Mr. J. H. Parker, a past-chairman of the Group, to which Mr. G. R. T. Edwards responded. Mr. G. J. Higgs, a past-chairman of the Group, proposed the health of the Chairman, Col. A. V. Sinclair, T.D.

This function was a great social success, and many applications for tickets, unfortunately, had to be refused.

Guests at the recent dinner and dance of the Swansea Group including Col. A. V. Sinclair (chairman) and Mr. H. G. Campbell (vice-president).

Presentation of gold wrist watches to Mr. K. J. Goddard and Mr. H. J. Slater, former joint hon. secretaries of the Nottingham Centre.

Nottingham Centre

The sessional meeting was held on February 3, when Mr. W. M. Pierce presented a paper, "Lighting for Sport." A large gathering of members and representatives of local sports clubs and associations attended, and the discussion period was one of the most lively which have taken place at meetings for many months. The discussion was opened by Mr. N. C. Slater.

I.E.S. Forthcoming Meetings

LONDON

April 19th

Sessional Meeting. "Electro-luminescence," by H. C. Bate and J. N. Bowtell. (At the Institution of Electrical Engineers, Savoy Place, W.C.2.), 6 p.m.

April 20th

Annual Dinner and Dance. (At the Café Royal, Regent Street, W.1.)

CENTRES AND GROUPS

April 1st

BATH AND BRISTOL.—Annual Dinner Dance. (At the Grand Hotel, Bristol.)

April 6th

EDINBURGH.—Annual General Meeting and Films. (At the Manor Club, 12, Rothesay Place, Edinburgh 3), 7 p.m.

NEWCASTLE.—Annual General Meeting. (At the Liberal Club, Pilgrim Street), 6.15 p.m.

SWANSEA.—"Black Light—its Effect and Applications," by H. L. Privett. (At the South Wales Electricity Board's Demonstration Theatre, The Kingsway, Swansea), 6.30 p.m.

April 7th

CARDIFF.—"Black Light—its Effect and Applications," by H. L. Privett. (At the South Wales Electricity Board's Demonstration Theatre, The Hayes, Cardiff), 5.45 p.m.

NOTTINGHAM.—"Compromise in Lighting Fittings Design," by J. Studholme. (At the East Midlands Electricity Board's Demonstration Theatre, Smithy Row, Nottingham), 6 p.m.

April 11th

SHEFFIELD.—Films, followed by Annual General Meeting. (At the Medical Library, The University, Western Bank, Sheffield 10), 6.30 p.m.

April 14th

MANCHESTER.—"Television Studio Lighting," by D. C. Lightbody. (At the North-Western Electricity Board's Demonstration Theatre, Town Hall, Manchester), 6 p.m.

April 19th

LIVERPOOL.—"Modern Developments in Discharge Lighting," by H. G. Jenkins. (At the Liverpool Engineering Society, 9, The Temple, 24, Dale Street, Liverpool), 6.30 p.m.

April 20th

NORTH LANCASHIRE.—Annual General Meeting. (At the North-Western Electricity Board's Demonstration Theatre, 19, Friargate, Preston), 7.15 p.m.

April 25th

LEICESTER.—"Lamps and Lighting for Inspection," by H. F. Belichambers. (At the East Midlands Electricity Board's Demonstration Theatre, Charles Street, Leicester), 6 p.m.

National Illumination Committee of Great Britain*

Report for the Year 1954

In view of the fact that the thirteenth session of the International Commission on Illumination is due to take place at Zürich, in Switzerland, from June 13 to 22, 1955, the principal activities of the committee and particularly of its sub-committees during 1954 have been concerned with preparation. Information has been provided by the sub-committees in answer to questionnaires on about 35 subjects, which are on the programme of the commission and which will be dealt with in Zürich; of these subjects, this country is responsible for the secretariat reports on the following five: Sources of Visible Radiation, Industrial Lighting, Theatre Stage Lighting, Lighting in Hazardous or Corrosive Situations, and Street Lighting. In addition the first report on Railway and Dock Lighting has been prepared in this country at the invitation of the CIE Scope Committee. As regards papers, six from this country have been accepted by the CIE Papers Committee and will be presented in the course of the session. All this preparation has involved a very considerable amount of work in an effort to furnish the Central Bureau with the final texts by the date required, i.e., December 15.

Although for all sub-committees the year has been one of sustained activity, it is not possible in this short report to refer to any but the more important developments. In the first place, it is likely that as a result of the efforts of the Swiss National Committee, a new vocabulary will be ready for consideration at the CIE meeting. Another important matter which will come up for discussion is the revision of the standard observer data, concerning which experimental work is in progress in this country. Further data are now available on the question of the colour-rendering properties of fluorescent sources and it is hoped that agreement will be reached on some method of specification.

Following the resignation of Dr. Aldington from the chairmanship of the Light Sources Sub-committee, Mr. H. R. Ruff has undertaken these duties, which have included the preparation of the secretariat report on this subject.

The revised report of the Mine Lighting Sub-committee has now been published in the "Transactions of the Institution of Mining Engineers" (Vol. 114, Part 3).

The study of the new subject of lighting in hazardous or corrosive situations has proved to be most useful, and considerable interest has been aroused, both in this country and abroad.

In connection with automobile headlights the series of tests carried out under the auspices of the ISO and the CIE in France, Germany and in this country was completed during the year and the first draft of the report, prepared by the Dutch National Committee, appeared to be a valuable document. The tests in this country were undertaken by the Road Research Laboratory and representatives were present from all the 13 interested countries. In another connection a working party of ISO and CIE representatives

* The N.I.C. is affiliated to the International Commission on Illumination. This report was approved at the Annual General Meeting of the Committee held on Thursday, January 27, 1955.

Constitution of Committee, December 31, 1954

Officers:—

Chairman: DR. J. W. T. WALSH.
Vice-Chairmen: DR. S. ENGLISH and F. C. SMITH.
Hon. Treasurer: DR. S. ENGLISH, Holophane House, Elverton Street, S.W.1.
Hon. Secretary: L. H. MCDERMOTT, National Physical Laboratory, Teddington, Middlesex.
Representatives of Great Britain on the Executive Committee of the International Commission on Illumination: DR. S. ENGLISH and F. C. SMITH.

Nominated by the Sponsoring Organisations:—

Illuminating Engineering Society: DR. J. N. ALDINGTON, J. G. HOLMES, E. C. LENNOX, L. H. MCDERMOTT, J. M. WALDRAM.
Institution of Electrical Engineers: PROF. H. COTTON, C. W. M. PHILLIPS, H. R. RUFF, DR. J. W. T. WALSH, G. T. WINCH.
Institution of Gas Engineers: J. B. CARNE, A. G. HIGGINS, P RICHBELL, F. C. SMITH, D. M. THOMPSON.

Nominated by the Co-operating Organisations:—

Admiralty: H. A. L. DAWSON.
Air Ministry: H. A. STAFFORD.
Association of Public Lighting Engineers: E. HOWARD, C. C. SMITH.
British Electrical and Allied Manufacturers' Association: J. M. H. STUBBS.
British Electricity Authority and its Area Boards: R. BIRT, M. D STONEHOUSE.
British Electrical Development Association: V. W. DALE.
British Plastics Federation: DR. W. E. HARPER.
British Standards Institution: J. F. STANLEY.
Department of Scientific and Industrial Research: (*National Physical Laboratory*) DR. W. S. STILES; (*Building Research Station*) W. ALLEN, DR. R. G. HOPKINSON.
Electrical Contractors' Association: A. H. OLSON.
Electric Lamp Manufacturers' Association: L. J. DAVIES, W. J. JONES, E. B. SAWYER.
Electric Light Fittings Association: W. E. J. DRAKE, D. L. TABRAHAM.
Gas Council: J. B. CARNE, F. W. SANSOM.
Glass Manufacturers' Federation: DR. S. M. COX.
Institution of Municipal Engineers: C. HARPER.
Medical Research Council: DR. W. J. W. FERGUSON, H. C. WESTON.
Ministry of Education: H. E. DANCE, A. P. POTT.
Ministry of Fuel and Power: J. COWAN, H. ROBINSON.
Ministry of Health: D. A. HUGHES.
Ministry of Labour and National Service: M. A. MCTAGGART.
Ministry of Supply: E. S. CALVERT, J. L. RUSSELL, BRIG. N. A. M. SWETTENHAM.
Ministry of Transport and Civil Aviation: DR. H. F. GILLBE, W. HADFIELD, H. G. LITCHFIELD.
Ministry of Works: W. E. RAWSON-BOTTOM.
National Coal Board: D. A. STRACHAN, P. N. WYKE.
Post Office: A. E. PENNEY.
Railway and London Transport Executives: A. H. COLE, H. E. STYLES.
Society of British Gas Industries: S. F. BAKER, P. C. SUGG.
Society of Glass Technology: DR. S. ENGLISH.

has been drawing up a specification for tail lamps and reflectors.

In view of the fact that the Lighting Practice Sub-committee had become overburdened in attempting to deal with nine subjects, a reallocation of responsibility was arranged, as a result of which the sub-committee retained only the subject of industrial lighting. Eight new sub-committees were therefore formed, the chairmen, with their respective subjects, being as follows: Mr. E. B. Sawyer (Home and Hotel Lighting), Mr. A. P. Pott (School and Office Lighting), Mr. W. E. Rawson-Bottom (Lighting of Public Buildings), Dr. W. J. Ferguson (Hospital Lighting), Mr. A. H. Olson (Lighting for Selling), Mr. M. W. Peirce (Lighting for Indoor Games), Mr. W. E. J. Drake (Lighting for Outdoor Games), and Mr. C. C. Smith (Floodlighting and Advertising Signs).

The CIE Panel has continued to deal with matters directly concerned with the commission; in particular it gave consideration to the question of the status of local representatives. This class of membership of the commission was introduced after the 1951 session in order to encourage interest in the commission in countries not already in membership. The scheme has worked well in autonomous countries, but the committee feels that it should not apply to districts such as colonies, for which the only contact should be the national committee of the parent country. The committee will therefore propose at the CIE session that the statute concerning local representatives should be worded in such a way as to limit the status of local representative to a resident in a country which is autonomous within the meaning of the statute governing the formation of a national committee.

Another important question has been concerned with the form in which the commission will produce the proceedings of the next session and incidentally the preprints of reports and papers. Various suggestions have been made in the Harath Letters, which have continued to be issued at three-monthly intervals, and the CIE Panel has offered appropriate comments.

The committee wishes to place on record its appreciation of the work of the late Mr. R. O. Ackerley. He had been a member of the committee for 11 years and his passing will be felt by both the committee and the commission.

It is with pleasure that the committee reports that the Ministry of Education has become a co-operating organisation of the committee; its representatives are Messrs. A. P. Pott and H. E. Dance. For the Department of Scientific and Industrial Research, Mr. W. Allen, of the Building Research Station, has replaced Dr. L. A. Sayce, of the National Physical Laboratory, whilst Mr. H. A. Stafford now represents the Air Ministry in place of Mr. Carpenter. The Illuminating Engineering Society has nominated Mr. E. C. Lennox to take the place of Mr. Baines, and for the Institution of Electrical Engineers Mr. G. T. Winch is now a member in place of the late Mr. Ackerley. The Ministry of Labour and National Service has reduced its representation to one member in the person of Mr. McTaggart, whilst Dr. S. M. Cox has replaced Dr. Hampton for the Glass Manufacturers' Federation. Mr. D. L. Tabraham is the new representative of the Electric Light Fittings Association following the resignation of Mr. G. Campbell.

It is of interest to note that the following new standards have been issued by the British Standards Institution: BS 1991: Letter symbols, signs and abbreviation—Part 1, general; BS 2467: Minimum safety requirements for lighting fittings (for use with hot cathode tubular fluorescent lamps); BS 2515: Reflex reflectors for vehicles, including cycles; BS 2516: Tail lights for vehicles, including cycles.

J. W. T. WALSH,
Chairman.

Book Reviews

"Lighting for the Stage," by P. Corry. Sir Isaac Pitman and Sons, Ltd. Pp. xiv + 157; 16 plates. Price 20s.

This is no volume of highbrow theories on lighting in the theatre. It avoids most carefully the type of essay on light and art (with capital "L" and "A") so beloved of some of the more abstruse writers on this subject, and keeps strictly to a down-to-earth and practical exposition of apparatus and methods, particularly for the amateur. It is, however, a compendium which will be most valuable to many of the theorists, who, while they describe at great length the effects which they wish to achieve and the deep subconscious emotions from which these effects should spring, so often neglect to describe the ironmongery required.

On the other hand, the author is careful to relate his lighting equipment to the rest of the stage furniture, showing, for example, with a valuable set of diagrams, the importance of proper placing of borders, ceilings and the like. He gives, too, some useful layouts of curtains, and in this, as in many other ways, tries to smooth the path of the tyro attempting this apparently simple but in fact very tricky craft of stage lighting.

The wide scope of the information which the book contains can be seen immediately from the chapter headings; for example, Stage Lighting Equipment, Lighting Control Equipment, The Cyclorama, Optical Effects and Scene Projection, Trick Lighting and Special Effects. There is, too, a chapter on Typical Lighting Problems, many of which are very familiar to anyone who has tried his hand at stage lighting. The lighting equipment is illustrated by a large selection of photographs which will help to identify some of the more curiously named devices. Only perhaps when he comes to control equipment does the author let himself wander from the needs of the amateur theatre by describing devices which are well outside the purse of most amateurs. Even here he may argue that the amateur may occasionally find himself in control of a switchboard in a larger theatre, and that a little knowledge will help him to make a tractable beast out of what at first sight appears a fearsome monster.

Throughout the book emphasis is placed on the key position of the producer in theatrical work, also on the fact that there is seldom an absolute right or wrong in stage lighting as in any other theatrical activity. This dictum is elaborated in a short preface by Tyrone Guthrie, and much of this preface is as applicable to lighting as a whole as it is to stage lighting: "... in matters of art ... I am quite sure that there is no Right Way of doing or thinking. What is right for me may be wrong for you. What is right on Monday may be wrong on Tuesday. If for Right and Wrong one substitutes the terms Appropriate and Inappropriate, it is possible to make more sense. ... But I still do not believe that there is an absolute standard of appropriateness. A thing is, or is not, appropriate in given circumstances, not objectively, but subjectively, because you or I think so."

Altogether a very handy book and a worthwhile addition on a subject which one had thought rather over-written.

W. R. S.

"Luminescence. British Journal of Applied Physics. Supplement No. 4." Pp. iv + 120. Published by the Institute of Physics (47, Belgrave Sq., S.W.1), 1955. Price 25s.

This volume, the format of which is the same as that of the journals published by the Institute of Physics, contains the 21 papers read at the conference on luminescence (with particular reference to inorganic phosphors) held at Cam-

bridge in April last. It includes also an introductory paper by Dr. S. T. Henderson, outlining the main practical and theoretical developments in the subject since the last conference, held at Oxford in 1938, as well as a summary of a lecture given by Dr. J. W. Strange on "Some unsolved problems in luminescence."

The papers, each of which is followed by a report of the discussion it provoked, are by authors from a number of countries overseas, as well as by experts working on the subject in this country. Some are purely theoretical, others very practical, but all are of a high scientific standard and generally well documented so that the volume as a whole will be of interest and of value to everyone working in this fascinating field. Further, since luminescent materials now play such an important part in modern methods of light production, every lighting engineer ought to follow as closely as he can the developments still taking place.

It is noticeable that no fewer than five of the papers are on some aspect of the phenomenon in which light is emitted from a phosphor under a rapidly alternating electric field. (The phenomenon, here as in most current literature, is called electroluminescence, in spite of the fact that that name was applied, at least 28 years ago, to the emission of light from a gas or vapour under the electric discharge.)

The value of the book is much enhanced by the inclusion of an excellent subject index, as well as an index of proper names.

J. W. T. W.

Light and Plant Growth

The Masters Memorial Lecture of the Royal Horticultural Society is to be given this year by Prof. R. H. Stoughton, D.Sc., of Reading University, who has chosen for his subject "Light and Plant Growth." The lecture is in two parts, to be delivered respectively on Tuesdays, April 19 and May 3, in the Lecture Room of the New Horticultural Hall, Elverton Street (near Vincent Square), at 3 p.m. on both days. The lecture is freely open, not only to Fellows of the R.H.S., but to any member of the public visiting the Society's Fortnightly Show then being held in the Hall. There is a small admission fee to the Show for non-members of the R.H.S.

Personal

MR. SAMUEL G. HIBBEN, former director of applied lighting for the lamp division of the Westinghouse Electric Corporation and a past president of the American Illuminating Engineering Society, has retired after nearly 40 years of service to the lighting industry. He and Mrs. Hibben will continue to make their home at Montclair, New Jersey; we wish them a long and happy retirement.

The Stanton Ironworks Co., Ltd., announce that MR. G. R. BUCKLEY, General Works Manager, has been appointed a Director of the Company.

Siemens Electric Lamps and Supplies, Ltd., announce the appointment of several new Assistant Area Managers. MR. H. A. PAGE has commenced duties as Assistant Area Manager at Birmingham, MR. J. E. WALKER at Belfast, MR. F. SMITH at Sheffield, and MR. A. CHAMBERS at the London Area Office. The new branch and depot at West Bay Road, New Docks, Southampton, is managed by MR. A. SHAW, who has been appointed Sub Area Manager. As from March 1, MR. T. O. WILKINS has taken up duties as Assistant Area Manager at the Bristol Branch.

Obituary

C. E. GREENSLADE

It is with deep regret that we have to report the death on January 31 of Mr. C. E. Greenslade, who for many years had been responsible for teaching illuminating engineering at the Borough Polytechnic. Mr. Greenslade had been an active member of the I.E.S. since 1911. It was largely due to his enthusiasm that courses for the City and Guilds syllabus were continued during the difficult years at the end of the war; subsequently, courses in many parts of the country were based on the experience he had gained at the Borough. His passing will be particularly regretted by the many students who have passed through his hands.

R. G. WEIGEL

We also record with regret the death on January 19, 1955, of Dr. Ing. R. G. Weigel, who for many years was Editor of the German journal *Lichttechnik*. He was 55 years of age.

Situation Wanted

CONSULTING post, or partnership, sought by Corporate Member I.E.S. (Registered), with considerable experience as senior lighting engineer in well-known firm. London or near. Box No. 887.

Situations Vacant

LIGHTING FITTINGS. Philips Electrical Limited have a vacancy in their Lighting Fittings Department for a Technical/Commercial Assistant. Applicants for this progressive appointment should be approximately 25/30 years of age and have had some previous experience in the manufacture and sale of Lighting Fittings. A good working knowledge of sheet metals and their fabrication and finishing and the types of machines used in the processing is necessary. Appointment calls for technical education to Higher National Certificate standard or equivalent. Previous commercial experience in the field of Lighting Fittings is essential. Permanent pensionable appointment with good staff conditions. Write, stating age and giving full details of education, training, and previous experience, to Personnel Officer, Philips Electrical Ltd., Century House, Shaftesbury Avenue, W.C.2.

ILLUMINATING ENGINEER required to assist in preparation of interior lighting schemes in London area. Write, stating age and experience, to Box No. 884.

LIGHTING SALES ENGINEER with ability to discuss modern lighting technique with Architects and users. Write, stating age and experience, to Box No. 885.

JUNIOR RESEARCH ENGINEER. The Lamp and Lighting Division of the Research Laboratory has a vacancy for a young man with a degree, H.N.C. or equivalent qualifications in electrical engineering or physics for investigations into the performance of discharge lamp circuits and field operational problems. Please write, giving full particulars, to the Director of Research, The British Thomson-Houston Co., Ltd., Rugby, quoting reference MVR.

PHYSICIST-CHEMIST with experience of Fluorescent Powder Coating Processes for work in London. Salary £750-£1,000 p.a. Box No. 886.

Fully trained LIGHTING ENGINEER required for London office. Applicant must be well educated and conversant with modern lighting methods. Apply Senior Lighting Engineer, Ekco-Ensign Electric Ltd., 45, Essex Street, Strand, W.C.2.

(*See also page* xx)

POSTSCRIPT By "Lumeritas"

A "working party" on artificial lighting in Post Office buildings has recently made an interesting report. Dealing with staff objections to fluorescent lighting, the working party found that these were chiefly the result of working conditions other than lighting. Nevertheless, "as the colour effect approximates to daylight fluorescent lighting should not be used at levels which simulate fading daylight." To prevent a gloomy appearance the illumination should not be below about 15 lm/ft². Although fluorescent lamps are not considered to give rise to harmful glare, it is recommended that the background against which they are seen should be adequately brightened and the lamps should be mounted as high as possible. The red deficiency in fluorescent light should be "balanced" by wall finishes of warmer colour than is the usual practice in tungsten lighted rooms. Given attention to these matters, the working party concluded that fluorescent lighting can be very satisfactory for Post Office work. The Post Office is, of course, a user of artificial lighting on a very large scale, and no doubt if there was previously any hesitation—on the score of suitability—to make extensive use of fluorescent light sources in Post Office buildings this has now been removed. But, as to the level of illumination necessary to prevent any suggestion of fading daylight, the New and the de Luxe Warm White tubes seem to be satisfactory in this respect when the illumination is somewhat lower than the value mentioned by the working party.

The credulity of my readers will doubtless be overtaxed if I say there is anything at all in common between fluorescent lamps and corsets! Believe it or not, however, there is—at least so it seems from a well-known corset manufacturer's advertisement which recently occupied an eye-catching position on the front page of my daily newspaper. Beside a curvilinear drawing suggesting that all the efforts of the fashion dictators to abolish the Gibson girl figure have been unavailing, this advertisement announced that "there is no other corset fabric like — — — and none so white as its new fluorescent white!" Well, there you are. Fluorescent lamps have evidently one quality which is worth claiming as a virtue of something quite different! And here, incidentally, is another exemplification of the theory I mentioned last October (apropos fluorescent lighting "kits") that "in the course of time everything is applied to whatever it is applicable to" [*vide* "Towards a law of creative thought," by R. E. M. Harding, Psyche Monographs, No. 7, Kegan Paul, Trench, Trubner and Co., Ltd., London, 1936]. The sketches accompanying Durrant's article "By Candlelight" in last month's *Light and Lighting* remind us of the diverse things which have been found applicable to lighting fittings and luminaires.

The latest addition to the illuminating engineering societies of the world is that recently formed in India—I.E.S.I.—and I have been reading with interest the inaugural issue of the society's journal, called "Indian Lighting." This well-produced journal is to be issued quarterly. Among the articles in the first issue is one reporting an investigation into the effects of improving illumination in weaving sheds upon the rate of cloth production and the quality of the product. In each of two mills work records were first obtained for two groups of weavers working with the existing levels of illumination—which were low, and comparable with those common in our own weaving sheds 25 years ago. The illumination for one of the groups in each shed—the experimental groups—was then increased. In one shed the increase was by a factor of about x3, and in the other about x2. The production of the two experimental groups was then compared with that of the two "control" groups over a period of some months. The published data show that, in both sheds, the greater illumination enabled the experimental groups to weave about 3 per cent. more cloth than the control groups. In one of the sheds the gain in quality of the cloth—assessed by the reduction in number of faults—was about 20 per cent. when the illumination was improved. I recall that in a report, published in 1938, on an investigation by Weston in a Yorkshire worsted weaving shed, a two-fold increase of illumination was shown to give a 5 per cent. increase in output. There was also a quality gain of 20 per cent. as judged by the time required to mend faults in the cloth woven. The similarity between the results of these different investigations is obvious, although the actual values of illumination compared by Weston were higher than those compared in the Indian study.

Applications of cold cathode lighting are becoming more numerous, and I note that a programme of modernisation adopted by the Transport Commission for the Eastern Region of British Railways includes two cold cathode lighting installations. One of these will be in a large new road motor repair depot to be built with a shell concrete roof at King's Cross, and the other will be at Norwich Thorpe Station. The decision to use cold cathode lighting was probably influenced by considerations of maintenance. The problem of maintenance is a serious one in various fields of application of hot cathode lighting. The fact is that, quite often, the cleaning of fittings housing fluorescent lamps is sadly neglected, and some of these fittings are dust traps and are sufficiently complicated to tempt users to "leave well alone"—to the detriment of their lighting as well as, unfortunately, to the discredit of fluorescent lighting. Despite the ingenuity of manufacturers in designing fittings which can be readily dismantled for cleaning, where no special maintenance staff exists users seem to fight shy of undertaking this very necessary business.